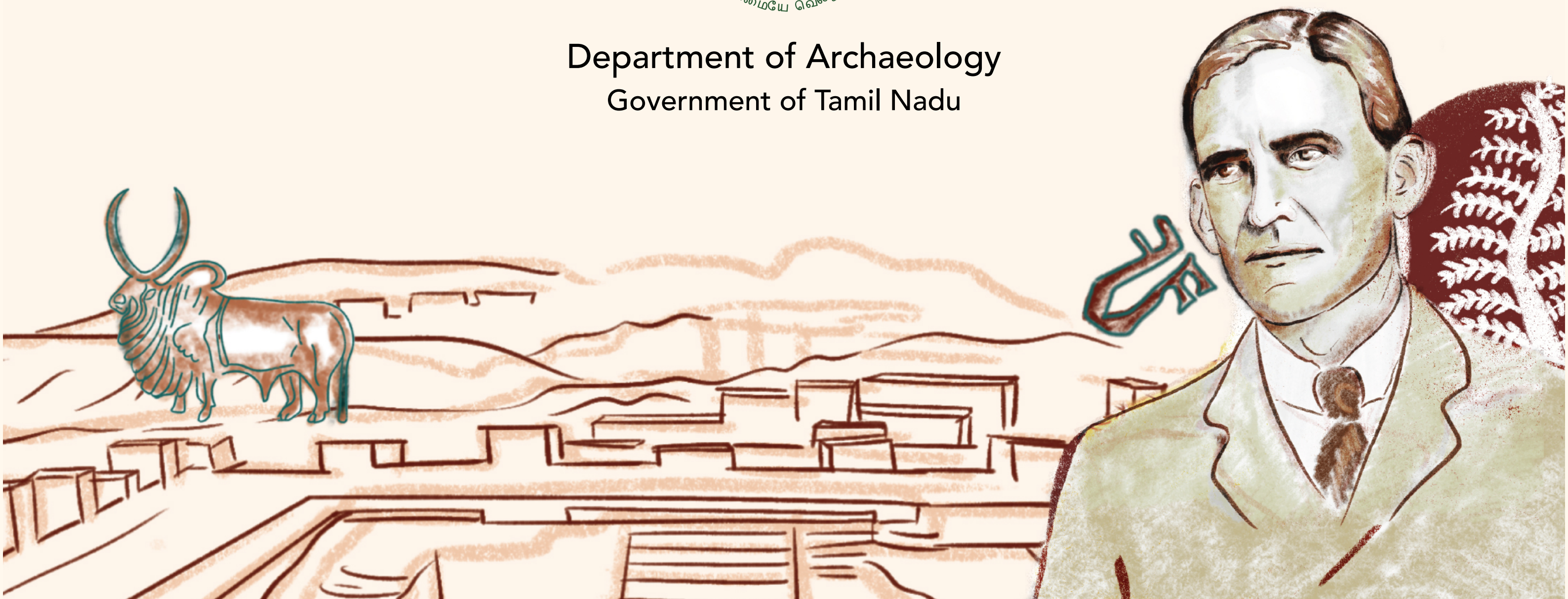
Discovery of Indus Civilization

Centenary

Three-day International Conference
Commemorating the Centenary Year of the announcement
of the discovery of the Indus Valley Civilization
January 05 - 07, 2025

Conference Proceedings

Department of Archaeology
Government of Tamil Nadu



DISCOVERY OF INDUS CIVILIZATION CENTENARY

Conference Proceedings

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About the Conference

The Indus Valley Civilization (IVC) was first announced to the world through *The Illustrated London News* on September 20, 1924, by Sir John Marshall. This announcement marked a turning point in the history of the Indian sub-continent, fundamentally altering our understanding of the past. This international conference was organized to commemorate this landmark discovery in its centenary year. The conference was jointly organized by the Tamil Nadu State Department of Archaeology and the Indus Research Centre of the Roja Muthiah Research Library.

Since its discovery, the IVC writing system has remained an enigma. Over the past 100 years, numerous Indus sites have been excavated in the sub-continent. Scholars such as Iravatham Mahadevan, Asko Parpola, Mark Kenoyer, Gregory Possehl, Nayanjot Lahiri, R. Balakrishnan and other scholars have examined various aspects of the IVC, contributing significantly to our understanding of this ancient civilization. The aim of this conference was to bring together scholars, archaeologists, historians, and enthusiasts to discuss and exchange ideas on the latest excavations, advancements in technology, and challenges in interpreting the Indus Civilization. The conference provided a platform for new-generation students to interact with international scholars, learn about the IVC, and dispel the misconceptions surrounding it.

விழாப் பேருரை

ஜான் மார்ஷலின் பணியைத் தொடர்வோம்

திரு. மு.க. ஸ்டாலின்

மாண்புமிகு தமிழ்நாடு முதலமைச்சர்

2021-ஆம் ஆண்டு நம்முடைய அரசு அமைந்ததும், ‘ திராவிட மாடல் அரசு’ என்று நாங்கள் அதற்குப் பெயர் சூட்டினோம். “இது ஒரு கட்சியின் அரசல்ல, இனத்தின் அரசு” என்று குறிப்பிட்டேன். அதற்கு அடையாளமாக இந்த விழா நடைபெற்றுக் கொண்டிருக்கிறது. இன வரலாற்றை ஆய்வுக் கண்ணோட்டத்தோடு பார்க்கும் முதிர்ச்சியின், அறிவுச் செயல்பாடாக இந்தக் கருத்தரங்கம் நடைபெறுகிறது.

சிந்துவெளிப் பண்பாட்டுக் கண்டுபிடிப்பின் நூற்றாண்டு நிறைவு விழாவை நாம் இப்போது கொண்டாடி இருக்கிறோம். இந்தியாவில் வேறு எந்த மாநிலத்திலும், இப்படி ஒரு விழாவை அரசே முன்னின்று நடத்தாது என்று சொல்லத்தக்க வகையில், மாபெரும் பண்பாட்டுப் பெருவிழாவாக இது ஏற்பாடு செய்யப்பட்டிருக்கிறது.

இந்தியத் துணைக்கண்ட வரலாற்றில் நமக்கான இடத்தை நிலைநிறுத்துவதுதான் நம்முடைய நோக்கம்!

வரலாறும், பண்பாடும், தொல்லியலும், தொலைநோக்குப் பார்வையும் கொண்ட இந்த விழாவை ஏற்பாடு செய்திருக்கும் மாண்புமிகு நிதி மற்றும் தொல்லியல் துறை அமைச்சர் திரு. தங்கம் தென்னரசு அவர்களுக்கும், நிதித்துறை முதன்மைச் செயலாளர் மற்றும் தொல்லியல் ஆணையர் திரு. உதயச்சந்திரன் அவர்களுக்கும் என்னுடைய மனமார்ந்த பாராட்டுதல்களையும், நன்றியையும் நான் தெரிவித்துக் கொள்ள விரும்புகிறேன். இரண்டு பேரும் தொல்லியல் ஆர்வலர்கள்! இப்போது கேட்டாலும், இந்த மேடையில்

மணிக்கணக்கில் சிந்துவெளியைப் பற்றி பேசக் கூடியவர்கள். இவர்கள் இந்தத் துறைக்கு கிடைத்திருப்பது இந்தத் துறைக்கு மட்டுமல்ல, தமிழ்நாட்டிற்கே பெருமை கிடைத்திருக்கிறது!

சிந்துவெளிப் பண்பாட்டுக் கண்டுபிடிப்பின் நூற்றாண்டு விழாவை கொண்டாட, தமிழ்நாடு அரசு தொல்லியல் துறையும், ரோஜா முத்தையா ஆராய்ச்சி நூலகத்தின் சிந்துவெளி ஆய்வு மையமும் இணைந்து இந்தப் பன்னாட்டு கருத்தரங்கம் ஏற்பாடு செய்திருக்கிறோம். இது நம்முடைய அரசின் கடமை!

இந்தக் கருத்தரங்கத்தில் வெளிநாடு மற்றும் நாட்டின் பல பகுதிகளில் இருந்தும் இருபதுக்கும் மேற்பட்ட அறிஞர் பெருமக்கள் கலந்து கொண்டு ஆய்வறிக்கைகள் வழங்க இருப்பது எனக்குப் பெருமிதமாக இருக்கிறது.

சிந்துவெளி நாகரிகம் முதன்முதலில் 1924-ஆம் ஆண்டு செப்டம்பர் 20-ஆம் நாளன்று உலகுக்கு அறிவிக்கப்பட்டது. ‘தி இல்லஸ்டிரேட்டட் லண்டன் நியூஸ்’ என்ற இதழில் இந்தியத் தொல்லியல் துறை டைரக்டர் ஜெனரல் சர் ஜான் மார்ஷல் அதை அறிவித்தார். இது இந்தியத் துணைக்கண்ட வரலாற்றில் ஒரு திருப்புமுனையை உண்டாக்கி, நம்முடைய கடந்த காலத்தை பற்றிய புரிதலையே மாற்றி அமைத்தது. ஆரியமும் சமஸ்கிருதமும்தான் இந்தியாவின் மூலம் என்று கற்பனையை வரலாறு என்று அதற்கு முன்னர் பலரும் சொல்லிக்கொண்டு வந்தார்கள். அதை மாற்றியது ஜான் மார்ஷல் அவர்களின் ஆய்வுகள்தான். சிந்துவெளி நாகரிகம் ஆரியத்துக்கு முற்பட்டது, அங்கு பேசப்பட்டது திராவிட மொழியாக இருக்கலாம் என்று அவர் நூறாண்டுகளுக்கு முன்பு சொன்ன குரல் இன்றைக்கு வலுப்பெற்றிருக்கிறது.

“என்னதான் அங்கு இல்லை!” என்று கேட்கும் அளவுக்கு நன்கு கட்டமைக்கப்பட்ட வளர்ச்சி பெற்ற ஒரு நாகரிகம் சிந்துவெளியில் இருந்ததை அங்கு கண்டெடுக்கப்பட்ட பல்வேறு அடையாளங்கள் காட்டுகிறது.

சிந்து வெளியில் ‘காளைகள்’தான் இருந்தது. இது திராவிடச் சின்னம்! சிந்துவெளியில் இருந்து, இன்றைய அலங்காநல்லூர் வரை காளைகள் இருக்கிறது. பழந்தமிழ் இலக்கியங்களில், ஏறுதழுவுதல் நிகழ்ந்ததற்கான சான்றுகள் இருக்கிறது. காளையைத் தழுவிப் போரிட்டு அடக்குவதால் ‘கொல்லேறு தழுவுதல்’ என்று வருகிறது. சிந்துவெளி நாகரிகம் சார்ந்த ஒரு முத்திரையில் காளை உருவமும், அதை அடக்க முயலும் வீரரை அந்தக் காளை தூக்கி வீசுவதும் இருக்கிறது.

அப்படியே மற்றொரு பக்கம் பார்த்தோம் என்றால், குதிரை முத்திரை சிந்துவெளியில் இல்லை. வேத இலக்கியங்களில் பெருநகரங்களும் இல்லை, தாய்த்தெய்வ வழிபாடும் இல்லை! ஆனால், இந்த இரண்டும் சிந்துவெளியிலும் இருக்கிறது! கீழடியிலும் இருக்கிறது! இதையெல்லாம் வைத்துதான் சங்ககாலத் தமிழர்களின் மூதாதையர் இருந்த இடம்தான் சிந்துவெளி என்று நிறுவப்பட்டிருக்கிறது.

சிந்துவெளி பற்றி ஜான் மார்ஷல் அவர்கள் தன்னுடைய கண்டுபிடிப்பை வெளியிட்டதும், தந்தை பெரியார் அவர்கள் தன்னுடைய விடுதலை நாளிதழில் அதைப் பற்றி கட்டுரைகள் வெளியிட்டிருக்கிறார். பேசியும் இருக்கிறார்.

தந்தை பெரியார் அவர்களை தொடர்ந்து பேரறிஞர் அண்ணா அவர்களும் 1948-ஆம் ஆண்டிலேயே சிந்துவெளி நாகரிகத்தின் அடையாளங்களை வெளிக்கொணர்ந்த

சர் ஜான் மார்ஷல் அவர்களின் சாதனைகளைப் பாராட்டி எழுதியிருக்கிறார். 2010-ஆம் ஆண்டு கோவை தமிழ்ச் செம்மொழி மாநாட்டை வெற்றிகரமாக நடத்திய முத்தமிழறிஞர் கலைஞர் அவர்கள் செம்மொழி மாநாட்டு இலச்சினையில், குமரி வள்ளுவர் சிலை, பிறப்பொக்கும் எல்லா உயிர்க்கும் என்ற குறள் வரியுடன் சேர்த்து, சிந்துவெளி முத்திரையையும் பதிவிட்டார்!

அந்த மாநாட்டில் புகழ்பெற்ற அறிஞர்களான அஸ்கோ பர்போலா, ஐராவதம் மகாதேவன், ஆர்.பாலகிருஷ்ணன் உள்ளிட்டோர் சிந்துவெளி பண்பாட்டையும், தமிழ்ப் பண்பாட்டையும் ஒருங்கிணைத்து முக்கியத்துவம் வாய்ந்த ஆராய்ச்சிக் கட்டுரைகளை வாசித்தார்கள்.

அந்த மரபின் வழி வந்த நம்முடைய திராவிட மாடல் அரசு சார்பில், இப்போது சிந்துவெளி பண்பாட்டுக் கண்டுபிடிப்பு நூற்றாண்டு நினைவு பன்னாட்டுக் கருத்தரங்கை நடத்துகிறோம்.

சிந்துவெளி வரி வடிவங்களும், தமிழ்நாட்டுக் குறியீடுகளும், ஒரு வடிவவியல் ஆய்வு என்ற நூலையும் இங்கு வெளியிட்டிருக்கிறேன். இதற்கெல்லாம் முத்தாய்ப்பாக, ஜான் மார்ஷல் அவர்களின் சிலைக்கு அடிக்கல் நாட்டி இருக்கிறேன்.

சிந்துவெளிப் பண்பாட்டை கண்டுபிடித்தது மூலமாக, நம்முடைய வரலாற்றையும், பெருமையையும் மீட்டவர் ஜான் மார்ஷல். அவரைச் சிறப்பிப்பது தமிழ்நாடு அரசுக்குப் பெருமை! சிந்துவெளிப் பண்பாடு பேசப்படும் வரைக்கும், ஜான் மார்ஷல் அவர்களுக்கு சிலை வைத்தது திராவிட மாடல் அரசு என்ற பெருமையும் நிலைக்கும்.

சிவகங்கை மாவட்டம், கீழடியில் தற்போது நடைபெற்று வரும் அகழ்வாராய்ச்சி உலக அளவில் எல்லோருடைய கவனத்தையும் கவர்ந்திருக்கிறது.

தமிழ்நாடு தொல்லியல் துறையால், இப்போது மேற்கொள்ளப்பட்டு வரும் அகழாய்வில் ஆதிச்சநல்லூருக்கு அருகே, சிவகளை ஆய்வு மூலம் ‘தண் பொருநை’ என்று அழைக்கப்பட்ட தாமிரபரணி ஆற்றங்கரை நாகரிகம், 3,200 ஆண்டுகளுக்கு முற்பட்டது என்று அறிவியல் வழிப்பட்ட ஆய்வுகள் அடிப்படையில் உறுதி செய்திருக்கிறோம்.

கீழடி அருங்காட்சியகம் போலவே, பொருநையிலும் ஒரு அருங்காட்சியகம் உருவாக்கப்பட்டு வருகிறது.

எட்டு இடங்களில் அகழ்வாராய்ச்சி நடைபெற்று வருகிறது. நம்முடைய அகழாய்வு முடிவுகள் பெரும் உற்சாகத்தைத் தருவதாக அமைந்திருக்கிறது.

குறிப்பாக, மட்பாண்டங்களில் காணப்படும் குறியீடுகளில், சிந்துவெளி எழுத்துக்களின் ஒப்பீட்டளவில் ஒற்றுமைகள் காணப்படுகின்ற இந்த மேடையில் வெளியிடப்பட்ட ஆய்வுநூல் விரிவாக விளக்குகிறது.

சிந்துவெளி நாகரிகத்தில், வணிக நோக்கத்திற்காக பயன்படுத்தப்பட்ட முத்திரைகளில் இடம்பெற்றிருக்கும் குறியீடுகளையும், தமிழ்நாட்டில் அகழாய்வுகளில் கிடைக்கும் குறியீடுகளையும் ஒப்பிட்டுப் பார்க்கும்போது 60 விழுக்காடு குறியீடுகள் ஒரே தன்மையிலான குறியீடுகளாக காணப்படுகிறது. அதேவேளையில், சிந்துவெளியில் பொதுமக்களால் பயன்படுத்தப்பட்ட மட்பாண்டங்களில் பொறிக்கப்பட்டிருக்கும் குறியீடுகளும், தமிழ்நாட்டில் பொதுமக்களால் பயன்படுத்தப்பட்ட மட்பாண்டங்களில்

பொறிக்கப்பட்டிருக்கும் குறியீடுகளும், அதிகபட்சமாக 90 விழுக்காடு ஒரே தன்மை கொண்டவையாக காணப்படுகிறது என்று நம்முடைய தொல்லியல் ஆய்வாளர்கள் இப்போது நிறுவியிருக்கிறார்கள்.

சிந்துவெளியில் கிடைத்த சூதுபவளம், அகேட், நீலப் பளிங்குக் கற்கள் ஆகியவற்றால் செய்யப்பட்ட கல்மணிகள், உயர் வெண்கலப் பொருட்கள் மற்றும் கருப்பு, சிவப்பு மட்கலன்கள், நீத்தாரை புதைக்கும் வழக்கம் போன்ற பண்பாட்டுக் கூறுகளின் எச்சங்கள், தென்னிந்தியாவுக்கும், சிந்துவெளி நாகரிக்கத்துக்கும் இடையேயான பண்பாட்டுத் தொடர்பை, தொடர்ச்சியை உறுதிசெய்கிறது.

இதற்கெல்லாம் மகுடம் வைத்தது போன்று, அண்மையில் சிவகளை, ஆதிச்சநல்லூர், மயிலாடும்பாறை, மாங்காடு, தெலுங்கானூர், கீழ்நமண்டி போன்ற இடங்களிடத்தில் கிடைத்த அறிவியல் காலக்கணக்கீடுகள் சிந்துவெளி நாகரிகமும் தமிழ்நாட்டின் இரும்புக் காலமும் சமகாலத்தவை என்பதை உறுதிசெய்கிறது என்று அறிவிப்பதில் நான் பெருமகிழ்ச்சி அடைகிறேன்.

அறிஞர் பெருமக்கள் நிறைந்த வரலாற்றுச் சிறப்புமிக்க இந்த நிகழ்ச்சியில் தமிழ்ப் பண்பாட்டை பேணிப் பாதுகாப்பதுதான் தமிழ்நாடு அரசின் தலையாய கடமை என்று உலகுக்கு உணர்த்தும் வகையில், மூன்று முக்கியமான அறிவிப்புகளை மிகுந்த மகிழ்ச்சியுடன் நான் வெளியிட விரும்புகிறேன்.

- செழித்து வளர்ந்த சிந்துவெளிப் பண்பாட்டின் எழுத்து முறையை இன்னும் நம்மால் தெளிவாக புரிந்துக்கொள்ள முடியவில்லை. நூறு ஆண்டுகளைக் கடந்தும் தீர்க்கப்படாத இந்த சிந்துவெளிப் புதிர் பற்றி உலகெங்கும் உள்ள தொல்லியல் ஆய்வாளர்கள், மொழியியல் தமிழ் அறிஞர்கள் மற்றும் கணினி வல்லுநர்கள் உட்பட பலரும் இன்றளவும் பெரும் முயற்சி செய்து கொண்டு இருக்கிறார்கள். அந்த முயற்சிகளை ஊக்கப்படுத்தும் வகையில், சிந்துவெளிப் புதிருக்கான உரிய விடையைக் கண்டுபிடித்து, சிந்துவெளி எழுத்து முறையை தெளிவாக புரிந்துகொள்ள உதவும் வழிவகையைத் தொல்லியல் அறிஞர்கள் ஏற்கும்படி வெளிக்கொணரும் நபர்கள் அல்லது அமைப்புக்கு ஒரு மில்லியன் அமெரிக்க டாலர் பரிசாக வழங்கப்படும் என்பது முத்தான முதல் அறிவிப்பு!

- சிந்துவெளி பண்பாடு குறித்து தொடர் ஆராய்ச்சிகளை, தமிழ்நாடு அரசு தொல்லியல் துறையுடன் இணைந்து ரோஜா முத்தையா நூலகத்தின் சிந்துவெளி ஆராய்ச்சி மையம் மேற்கொள்ளும் வகையில் தலைசிறந்த தொல்லியல் அறிஞர் ஐராவதம் மகாதேவன் அவர்கள் பெயரில் ஓர் ஆய்வறிக்கை அமைக்க 2 கோடி ரூபாய் நல்கை வழங்கப்படும் என்பது இரண்டாவது அறிவிப்பு!

- தமிழ்ப் பண்பாட்டின் தொன்மையை உலகமே தெரிந்து கொள்ள வேண்டும் என்று ஓயாமல் உழைக்கும் தலைசிறந்த தொல்லியல் அறிஞர்கள் மட்டுமின்றி, கல்வெட்டியல் ஆய்வாளர்கள், நாணயவியல் வல்லுநர்கள் ஆகியோரையும் ஊக்கப்படுத்தும் விதமாக, ஆண்டுதோறும் இரண்டு அறிஞர்களுக்கு விருதுகள் வழங்கப்படும். இது மூன்றாவது அறிவிப்பு.

இந்த மூன்று அறிவிப்புகளும் இந்தத் துறை ஆய்வுகளுக்கு வேகத்தையும், ஊக்கத்தையும் வழங்கும் என்று நான் நம்புகிறேன்.

சிந்துவெளி முதல் கீழடி வரை தமிழினத்தின் பெருமை நிரம்பி இருக்கிறது. பாவாணர், ராசமாணிக்கனார், க.த.திருநாவுக்கரசு போன்ற மாபெரும் அறிஞர்கள் எல்லாம் இது குறித்து எழுதியிருக்கிறார்கள். ‘சிந்து முதல் வைகை வரை’ என்ற நூலை நம்முடைய ஆர்.பாலகிருஷ்ணன் அவர்கள் எழுதி இருக்கிறார். டோனி ஜோசப் அவர்கள் மரபணு, மானுடவியல் சார்ந்த ஆய்வுகளை வைத்து நிறைய எழுதிக்கொண்டு வருகிறார். இன்னும் ஏராளமான ஆய்வுகளும், கண்டுபிடிப்புகளும் வந்து கொண்டிருக்கிறது.

அறிவியல் முறைப்படி சான்றுகள் அடிப்படையில், தமிழ்ச் சமூகத்தின் தொன்மையை அறிவுலகம் இப்போது ஏற்றுக்கொள்ளத் தொடங்கி இருக்கிறது. இந்தியத் துணைக்கண்டத்தின் வரலாற்றைத் தமிழைத் தவிர்த்துவிட்டு இனி எழுதமுடியாது என்று நாம் உரக்கச் சொல்வோம்! ஜான் மார்ஷல் அவர்களின் கண்டுபிடிப்பின் நூற்றாண்டில் அவருக்கு நாம் நன்றியை உரித்தாக்கி, அவர் விட்டப் பணியை நாம் தொடர்வோம்!

வாழ்த்துரை

திரு. தங்கம் தென்னரசு

மாண்புமிகு நிதி, சுற்றுச்சூழல் & காலநிலை மாற்றம்
மற்றும் தொல்லியல் துறை அமைச்சர்

தமிழ்நாட்டில் நடைபெற்று வரும் தொல்லியல் ஆய்வுகள் தமிழ்ப் பண்பாட்டின்மீதும் தமிழ் மக்களின் வரலாற்றின்மீதும் புதிய ஒளிகளைப் பாய்ச்சி வரும் வேளையில், சிந்துவெளிப் பண்பாட்டு கண்டுபிடிப்பின் நூற்றாண்டு நிறைவு விழாக் கருத்தரங்கம் மிகச் சிறப்பாக ஒருங்கிணைப்பட்டது. அந்தக் கருத்தரங்கில் சமர்ப்பிக்கப்பட்ட ஆய்வுக்கட்டுரைகள் நூலாக்கம் பெறுவது மிகுந்த மகிழ்ச்சியளிக்கிறது.

மாண்புமிகு தமிழ்நாடு முதலமைச்சர் திரு. மு.க. ஸ்டாலின் அவர்களின் வழிகாட்டலில் மிகச் சிறப்பாக தொல்லியல் பணிகளை மேற்கொண்டிருக்கும் தமிழ்நாடு அரசின் தொல்லியல் துறை, தமிழ்ப் பண்பாட்டின் அடையாளங்களில் ஒன்றான ரோஜா முத்தையா ஆராய்ச்சி நூலகத்துடன் இணைந்து சிந்துவெளிப் பண்பாட்டு கண்டுபிடிப்பின் நூற்றாண்டு நிறைவு விழாக் கருத்தரங்கை நடத்தியது பாராட்டுக்குரியது; கருத்தரங்கின் கட்டுரைகளை நூலாகக் கொண்டுவருவது மிக முக்கியப் பணி. அந்தப் பணியைச் சிறப்பாகச் செய்திருக்கும் தமிழ்நாடு அரசின் தொல்லியல் துறைக்கும் ரோஜா முத்தையா ஆராய்ச்சி நூலகத்துக்கும் என்னுடைய வாழ்த்துகள்.

சிந்துவெளி எழுத்துமுறை முழுவதையும் அறிந்துகொள்ள வழிகோலும் தொல்லியல் ஆய்வு நிறுவனங்களுக்கு ஒரு மில்லியன் அமெரிக்க டாலர் வழங்கப்படும் என்றும், தலைசிறந்த தொல்லியல் அறிஞர் ஐராவதம் மகாதேவன் அவர்களின் பெயரில் ஆய்விருக்கை அமைக்க ரூ.2 கோடி நிதி ஒதுக்கீடு செய்யப்படும் என்றும், தமிழ்ப்பண்பாட்டின் தொன்மையை உலகறியச் செய்ய அளப்பறியப் பங்காற்றும் தலைசிறந்த தொல்லியல் அறிஞர்கள், கல்வெட்டியல் ஆய்வாளர்கள் மற்றும் நாணயவியல் வல்லுநர்களை ஊக்கப்படுத்தும் விதமாக இருவருக்கு விருது வழங்கப்படும் எனவும் மாண்புமிகு முதலமைச்சர் அவர்கள் வெளியிட்ட முத்தான மூன்று அறிவிப்புகள் புதிய தலைமுறை தொல்லியல் ஆய்வாளர்களையும் ஆர்வலர்களையும் உருவாக்க வழிசெய்யும். அவர்களுக்கு இந்த ஆய்வுத் தொகுப்பு ஒரு வழிகாட்டியாக அமையும்.

அறிமுகவுரை

திரு. த. உதயசந்திரன் இ.ஆ.ப.

தமிழ்நாடு அரசு முதன்மைச் செயலாளர், நிதித்துறை
மற்றும் தொல்லியல்துறை ஆணையர்

சிந்துவெளிப் பண்பாட்டு கண்டுபிடிப்பின் நூற்றாண்டு நிறைவு விழா மாண்புமிகு தமிழ்நாடு முதலமைச்சர் திரு. மு.க. ஸ்டாலின் அவர்களின் வழிகாட்டலில் மிகச் சிறப்பாக நடைபெற்றது. இந்த மாபெரும் பண்பாட்டுத் திருவிழாவைக் கொண்டாட, தமிழ்நாடு அரசு தொல்லியல் துறையும் ரோஜா முத்தையா ஆராய்ச்சி நூலகத்தின் சிந்துவெளி ஆய்வு மையமும் இணைந்து பன்னாட்டுக் கருத்தரங்கை ஏற்பாடு செய்திருந்தன.

இந்தக் கருத்தரங்கத்தில் வெளிநாடுகளிலிருந்தும் இந்தியாவின் பல பகுதிகளில் இருந்தும் இருபதுக்கும் மேற்பட்ட அறிஞர்கள் பங்கேற்று ஆய்வறிக்கைகள் வழங்கினர்; பல்வேறு பின்னணியிலிருந்து வந்த சுமார் 600 பேர் கருத்தரங்கில் பங்கேற்றனர். சிந்துவெளி ஆய்வுப் போக்கில் இதுவொரு சிறப்பான முன்னகர்வு.

வரலாற்று முக்கியத்துவம் வாய்ந்த இத்தொகுப்பில், சிந்துவெளி குறியீடுகள் பற்றிய பதிவுகள் முக்கிய இடம் வகிக்கின்றன. சிந்துவெளி குறியீடுகளுக்கும், தென்னிந்தியா - குறிப்பாகத் தமிழ்நாட்டின் மட்பாண்டங்களில் இடம்பெற்றிருக்கும் குறியீடுகளுக்கு இடையேயான அபூர்வமான ஒற்றுமை குறித்து கருத்தரங்கில் வாசிக்கப்பட்ட ஆய்வுக்கட்டுரைகள் முக்கியத்துவம் வாய்ந்தவை.

நூற்றாண்டு காலமாகத் தீர்க்கப்படாமல் இருக்கும் சிந்துவெளி புதிர் குறித்து அதன் எழுத்து முறையைப் படிப்பதற்கான சிக்கல்கள், சவால்கள், வழிமுறைகள் குறித்து வாசிக்கப்பட்ட ஆழமான மூன்று கட்டுரைகள் இத்தொகுப்பில் இடம்பெற்றுள்ளன.

இடப்பெயரியல் ஆய்வு, கொற்கை என்றும் வஞ்சி என்றும், தொண்டி என்றும் சிந்துவெளிப் பகுதியில் ஏன் தமிழ்ப் பெயர்கள் நிலவி வருகின்றன என்கிற கேள்வியை முன்வைத்து விவாதிக்கப்பட்ட இடப்பெயர் ஆய்வுகள் புதிய வெளிச்சம் பாய்ச்சுகின்றன.

மரபணுவியல் குறித்து தமிழ்நாடு தொல்லியல் துறை மதுரை காமராசர் பல்கலைக்கழகத்தின் உயிரி தொழில்நுட்பத் துறையுடன் சேர்ந்து அமெரிக்காவின் ஹார்வர்டு பல்கலைக்கழகத்தினுடைய டேவிட் ரீக் ஆய்வகத்துடன் இணைந்து நடத்தும் அந்த மரபணுவியல் ஆய்வு முடிவுகளின் தொடக்க முடிவுகள் மிகவும் உற்சாகம் அளிக்கின்றன.

அதே போல, பாறை ஓவியங்கள், சிந்துவெளி நாகரித்தினுடைய எச்சங்கள், சுவடுகள் பாறை ஓவியங்களில் இடம்பெற்றிருக்கின்றனவா என்பது குறித்த விவாதம் இன்றைய சூழலில் முக்கியத்துவம் பெறுகிறது.

இப்படி சிந்துவெளி ஆய்வின் திசைவழியை மேலும் துலக்கப்படுத்தும் முக்கியத்துவம் வாய்ந்த ஆய்வுகளின் பெட்டகமாக இத்தொகுப்பு உருவாகியிருக்கிறது.

தமிழ்நாடு தொல்லியல் துறை முக்கியமான பல ஆராய்ச்சிகளை முன்னெடுத்து வந்துகொண்டிருக்கிறது. அதற்கான முக்கியமான காரணம், மாண்புமிகு தமிழ்நாடு முதல்வர் அவர்கள், “இந்தியத் துணைக்கண்டத்தின் வரலாறு இனி தமிழ் நிலப்பரப்பில் இருந்துதான் எழுதப்பட வேண்டும்,” என தமிழ்நாட்டுச் சட்டமன்றத்தில் கம்பீரமாக உரத்துச் சொன்ன அந்த வாசகம்தான் எங்களை உந்திச் செலுத்துகிறது. எங்களை ஊக்கப்படுத்தும் அந்த வாசகம்தான் இந்தளவுக்குத் தொல்லியல் முயற்சிகளை மேற்கொள்ள உந்தியிருக்கிறது.

இந்தப் பின்னணியில், கருத்தரங்கில் மாண்புமிகு முதலமைச்சர் அவர்கள் வெளியிட்ட மூன்று அறிவிப்புகள் தொல்லியல் துறைக்கும் தொல்லியல் ஆர்வலர்களுக்கும் இன்ப அதிர்ச்சியாக அமைந்தன.

தமிழ்நாட்டில் தொல்லியல் ஆர்வத்தை மேம்படுத்தி ஆய்வுகளை ஆழப்படுத்தும் மாண்புமிகு முதலமைச்சர் அவர்களின் முன்னெடுப்புகளுக்குத் தொல்லியல் துறையின் சார்பின் நன்றியைத் தெரிவித்துக் கொள்கிறேன்.

வரலாற்று முக்கியத்துவம் வாய்ந்த இக்கருத்தரங்கைத் தொல்லியல் துறையுடன் இணைந்து நடத்தி, கருத்தரங்கக் கட்டுரைகளை நூலாக வெளியிடும் ரோஜா முத்தையா ஆராய்ச்சி நூலகத்துக்கும் அதன் சிந்துவெளி ஆய்வு மையத்துக்கும் என்னுடைய வாழ்த்துகள்.

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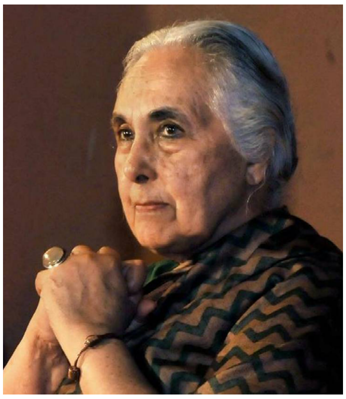
The statue of Sir John Hubert Marshall was unveiled by
Honourable Tamil Nadu Chief Minister Thiru. M.K. Stalin
at the Egmore Museum complex in Chennai on March 19, 2025.

Opening Address

Archaeology that Changed the Picture

Prof. Romila Thapar
Emeritus Professor of History at the Jawaharlal Nehru University, New Delhi



The centenary of a civilization needs to be celebrated, especially where the civilization has considerably altered the history of early times. In India, the Indus civilization played a big role in forcing us to realign our views of the beginnings of history. Up to 1925, the early history of India began with the Vedic cultures and the kind of societies these had created. The sources were the orally memorized hymns of the Vedas composed after the decline of the Harappan cities in about 1500-1000 BC. But with the discovery of the Indus civilization, the construction of the earliest major culture of India, pointed up the elements of the overwhelmingly different culture of the Harappans as compared to that of the Aryans.

It revealed the presence of a very impressive civilization in India.

The expanse of the civilization was not based on conquered territories put together as an empire or a large state, so the impact of this expansive system was different. There were settlements and there were spaces in between. These were lands that were gradually assimilated into the pattern of administration and the economy of trade as it grew more extensive. The point about trading is that it links extensive areas that do not have to be conquered, as in this case, from Punjab to the Euphrates delta and from Badakshan to Oman. The presence of those involved in trading gets recorded. Furthermore, there is a westerly orientation of the extension of the Indus Culture. There is little indication that the Harappans were moving eastwards into the Ganges plain. The Mesopotamian sources speak of the countries to the east of them – Meluhha, Makkan and Dilmun. Scholars that have tried to identify these areas have argued for their being located in Iran and the Persian Gulf.

Iravatham Mahadevan has argued that Meluhha is perhaps a version of Milakkhu, Melakkhuka or Milaca, that could be Dravidian names for the westerly elevation in the Indus cities. I have argued that these could be Mesopotamian versions of local Indian, perhaps Dravidian names later rendered into Indo-Aryan. Pali texts mention names such as Milkakh/ Milakkhu, which is linked to mleccha used in Indo-Aryan, and has a similar

meaning of a person using a different language and having an alien – even barbaric-way of life. A Buddhist text states that Milakkhuka refers to the Andhras and Damils, etc. The other form, Milaca, has the same meaning but refers to a person who lives in the woods. This would not be a description of a sophisticated urban life-style. The entire matter needs further investigation.

It is important to keep in mind that these western contacts were firmly established during Harappan times. We would do well to examine this area more thoroughly.

As a civilization, the Harappan was extensive. But significantly, it does not seem to have been a conquered territory. The sites are places where the Harappans had settled and probably chosen because of their connection to trade. Largely through trade, it touched many distant points that went westwards into Mesopotamia and southwards to the Persian Gulf. The export of lapis to the west took the Harappans as far north as Badakshan.

Westward they went to the Tigris-Euphrates delta and further up. The Mesopotamians refer to the lapis as coming from across seven ranges of mountains. This was no small distance. This was the land route crossing Iran and present-day Afghanistan. But equally active was the sea route that went through the Persian Gulf. Harappan finds occur in places like Bahrein and southwards to Oman. Here the search was for copper, also in much demand in Mesopotamia.

We have always viewed the Indus civilization as part of the Indian sub-continent and tended not to emphasize its westward contacts. But it did have a presence in relation to West Asia. The presence came from the activities of trade. The Harappans supplied the Mesopotamians with some substantial objects and some more marginal. The effective trade was in the supply of lapis lazuli and also copper, which may have been shaped as ingots. Lapis is used in the decoration of tombs in Mesopotamia. Since there was none available locally it seems to have come from what the Harappans supplied. Lapis was available in Badakshan in the Oxus region, and in the mountains in eastern Iran. Copper was available at various places in the vicinity of the Indus and beyond. The relatively recent discoveries of Harappan settlements near copper sites in Oman might be an indicator of this.

The distinctly western orientation of this trade, the continuation of which in history we have until recently tended to ignore, is now forcing us to think otherwise. The archaeology of the region just to the south of the Persian Gulf and hovering over the Red Sea has provided evidence of yet another trading pattern that emerged later than the Harappan but also focusing on the lands to the west of the sub-continent. I am referring to what used to be called the Indo-Roman trade but is now often referred to as the eastern Mediterranean trade with Western India, of which the major route was the Red Sea.

What I am trying to suggest is that the discovery of this cultural pattern is not just linked to the Red Sea, but could perhaps be considered in the wider perspective of activities in this part of Western Asia in general. I am not, however, suggesting a continuation from the Harappan. There is a gap in sources from Harappan times to the mid first millennium BC. For this gap to be filled would require extensive excavation in this area. What I am suggesting is that when we study the western part of the Indian sub-continent, then we have to consider not just local evidence but examine evidence that we might have for the intervening period from other localities between the Indian sub-continent and West Asia.

If, in northern India, relatively fewer sites have been excavated that date to the post-Harappan period of the late second and early first millennium BC, there are many southern sites. For example, a variety of Megalithic cultures in the peninsula and going south. This period has been somewhat neglected by archaeology in the past, but is now indicating that intensive exploration and excavation of potentially important sites has become a necessity. It seems to have been a period of much significance in both the north and the south. Its significance increases by the fact that the cultures so far excavated are diverse with variant cultural patterns. Was there then an interface of cultures that contributed to the creation of the dominant cultures?

There seem to have been no strong ostensible links to the major known culture of the Harappans, yet we have to discover who were their authors? If they were migrants from the declined Harappan cities, there would certainly be patterns of cultural depictions that would recall something of the Harappan. But there seems to be an absence of these. The other culture that made an imprint, judging from oral literary evidence, would have been that of the Indo-Aryans, who themselves were migrants into India soon after 2000 BC, as is suggested in some readings from DNA sources. There is nothing obvious in the Aryan literature that suggests similarities with what is revealed by excavation. For example, the Harappans and the Megalithic cultures had graves for their dead, although the graves are distinctly different and are indications of different cultures. The Indo-Aryan speakers, however, largely cremated their dead.

One could continue this enquiry and ask what happened to the Harappan pictograms which were perhaps used in establishing literacy. There has, of course, been a debate on whether or not, these were a script as we understand the function of the script in later languages. Even if they did not constitute a script, they would have been used to convey something of what the pictograms represented. What was the language of this representation? This has been an endless debate over the past century. Attempts have been made to try and give a reading in Indo-Aryan, but this has not provided a solution, nor has a Dravidian reading been successful.

The Harappan culture is very different from that of the Indo-Aryan speakers. The Harappans were urban dwellers who lived in cities. The Indo-Aryans were agro-pastoralists and their hymns do not feature cities or urban life. The Harappans had a script, even if we have not deciphered it so far, and it was used in every day functioning presumably to identity names and objects. The Indo-Aryans had no script. Communication was entirely oral. There is a big difference between what the archaeology of the Harappan cities and the pictograms on the seals tell us about what may have been the language and the script, and what may have been the oral tradition of the Indo-Aryans.

Some hints have come in from specialists in linguistics. It has been argued that Vedic Sanskrit has small elements that are otherwise only linked to Dravidian languages. This does not mean that the language was Dravidian, but that it may point to speakers of Indo-Aryan living in the vicinity of speakers of Dravidian. Possibly through the interaction of the two cultures, a few elements of the one may have been picked up by the other. A few words of the vocabulary are thought to have been derived from Dravidian words. A few grammatical forms seem alien to Indo-Aryan and are familiar from Dravidian.

The interesting fact about this is that these elements are only found in Indo-Aryan and in no other form of the Aryan languages. For example, the early language used in texts and inscriptions in Iran, uses Irano-Aryan, which is a cognate language of Indo-Aryan, both belonging to the same linguistic family. The two were in close contact and have many similarities. The Achaemenid Iranian king Darius states in one of his inscriptions quite categorically that he is an Aryan. So it would seem that the Aryan speakers in India, and specifically only these, perhaps lived closely with people who spoke a Dravidian-based language, and some elements of Dravidian may have been picked up by the Indo-Aryan speakers. Vedic sources do distinguish clearly between the two cultures – the arya and the dasa. The two are distinctly different and perhaps spoke different languages. The cultural difference is something that needs to be investigated and studied.

My perennial question that I have not been able to answer is that there are a few references in the Vedic texts to what are called, the dasi-putra brahmanas. The meaning is problematic. Dasi-putras would be sons of dasi women, but how can they be brahmanas? They are singled out and labelled as different, yet they are not called mleccha and are given the status of brahmana. There must have been some cultural interface between the two cultures for such a category to evolve. Of course, when it comes to language, there need not be only two languages in conversation, as there may have been other languages concurrently spoken. For example, Munda has also been suggested apart from Dravidian languages. India has a long tradition of variant languages in simultaneous use. Communities of traders would certainly be using more than one language.

I don't intend to speak at length on the new evidence that is coming, linked not only to the post-Harappan culture but also the areas adjacent and just beyond it – the frontier zones of the north-west of India that bordered on Iran and Central Asia, and on the south side, the settlements that were to provide the roots of the cultures that became significant at the turn of the Christian era. In all this, the one activity that is prominent in all the varied cultures is their interaction. We have to stop thinking of cultures as isolated, and start tracking interactions.

When we start talking about the interaction of cultures, then other historical questions have to be asked. What was the identity of the participants in these cultural interactions? Was there a distinction between the indigenous people and those that migrated to India from elsewhere. All of the sub-continent received migrants. The history of the north was tied to activities in Central Asia and Mesopotamia. The entire peninsula had quite other connections, with West Asia, for instance. These were to extend further to other lands. Identity therefore becomes a problematic question. It is never solved unless seriously investigated, and is present in all periods of history, because there are always migrants from across the borders coming in to settle. Had India not been such a rich and welcoming country, there might have been fewer migrants coming in. Historically, we have had migrants from many places that surround us. But historians have tended to be rather quiet about the contribution of migrants and settlers to the making of Indian culture.

Then there is also the problem of defining the various cultures that were interacting either through pastoralism, or trade or conquest, and ascertaining their interface. In parts of the sub-

continent, the Bronze Age was mutating into the Iron Age. This brought recognizable changes in cultural patterns with a fundamental change in technology. Archaeology is changing the picture for the period of circa, 1500 to 500 BC. Dramatic changes in this period take place in the middle Ganges plain with a new urbanization and the culture it brings; and now we know that the peninsula is asserting its presence with its array and variety of Megalithic Cultural sites in the Deccan and south India. Are these potentially pre-urban sites, with the exception of some, such as Keeladi, which is urban? Will this turn out to be the hub of another urbanization? Looking at the picture that is emerging, there has to be as much focus on the archaeology of the peninsula as there has been on India, north of the Vindhyas.

I have been speaking of civilization in terms of the economy, the society and the environment. What belief systems they had is hard to define as we have no written texts, and have to wait until the pictograms are read. Some guesses have been made but they remain guesses. Even more significant and more difficult to discover from the limited sources we have, is evidence of the social values that these many cultures propagated. A civilization must also have a strong presence of ethics – in fact, that is one of the determining features of what we call, civilization. Ethics includes an insistence on understanding the other cultures and where there is disagreement, then at least contesting it, but not violently silencing it. This is a form of tolerance, which dismisses violence. This was the message of the Shramana religious sects that emphasized the ethics of understanding and compassion. The historical question remains open as to where these ethics originated. Were they entirely a reaction to Vedic Brahmanism and its teaching, or did they go back to other roots that may have been present in the sub-continent deriving from other cultures?

Let me conclude by saying that in celebrating, and very justifiably so-the centenary of the substantial and impressive Indus civilization, we cannot stop at this point. What the discovery of the Indus civilization revealed was a view of the horizon that lay before us which had not been revealed until then. As happens in all such discoveries, it also opens up a large number of questions. As we know, the advance of knowledge lies in asking questions of it. The answers we work out either change our historical perceptions or remain unanswered. Some of answers involve archaeologists and historians, but many demand inputs from others. Today when we study aspects of the Indus civilization, we consult a number of specialists in different fields but whose knowledge is necessary. These are specialists in linguistics in our research of the possible languages, horticulture to examine possible changes of diet with new people settling in fertile lands, hydraulic studies to explain the many changes in the Panjab rivers like the Satlej and the Hakra, ecological investigations that may have affected the decline of some areas, and genetics, used in trying to identify people, if we are to arrive at a fuller understanding of the Indus civilization or for that matter the history of early Indian. To these we may add those philosophers who might like to explore the intellectual life of those times as and when the evidence becomes available.

The discovery of the Indus civilization, raised new questions. Innovative explanations have to be taken further, but only after they have been tested by the application of the historical methods of investigation. The centenary of the discovery of the Indus civilization marks a

point when we take count of what we have done and how we have got to where we have, but more importantly, it also marks of point of what we need to do in further investigations. Let's hope these investigations can be carried out, and that our knowledge of the Indus civilization can be further illuminated.

Keynote Address

The Indus Civilization: Looking Back at an Epochal Discovery[1]

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About a century ago, John Marshall made an announcement in *The Illustrated London News* which dramatically altered existing perceptions of India's antiquity. On 20th September 1924, he made known the discovery of 'the civilization of the Indus valley' and it is for that reason that he came to be famously described as 'the man who, archaeologically speaking, left India three thousand years older than he had found her.' It is also some twenty years since my book on the discovery of the Indus Civilization was published. As I look at my own journey of inquiry around how this civilization was discovered, at the outset, I want to mention two points. First, the Indus discovery is different from that of many other archaeological discoveries. Unlike accounts which are retrospectively told as neat narratives by their discoverers, this one cannot be written around a hero and one who knew the significance of what he was about to uncover. Rather, the credit for unearthing the Indus civilization goes to several archaeologists, most of whom were connected in various ways with the Archaeological Survey of India, a government department of the British Raj. Equally, some of them quite unexpectedly, and without any planning on their part, discovered clues which would eventually change the way the Indian past was visualized. Second, there is no accepted contemporary account about how the discovery unfolded. None of the characters either penned narratives or wrote their memoirs. Instead, what we have are piles of government files, which have an advantage in that they were not produced to showcase a neat, retrospective version of how India's ancient civilizational past was recovered. These files turned out to be a treasure mine for me, and it was these which allowed me to put together the story that I will narrate today.

As for the story itself, it culminated on 20 September 1924, when the scholar-archaeologist John Marshall announced its discovery. But the discovery was

1 This lecture is based on the centenary edition of my book *Finding Forgotten Cities – How the Indus Civilization was Discovered* (Permanent Black, 2023).

some ninety years in the making. The story began in 1831 when Charles Masson, a deserter from the British East India Company, first saw the brick ruins of Harappa and described them in a published account some years later. Masson did not discover its antiquity because he thought it was a city called Sangala mentioned in the accounts of Alexander's invasion of India. Some decades later, it was excavated by Alexander Cunningham and in his case, while he noted the presence of a typical Indus seal, he thought it was a city that had been visited by Xuanzang in the 7th century. Evidently, neither he nor Masson discovered the significance of Harappa because they viewed it through texts, either through a Classical lens or through those of Chinese pilgrims. And then there was John Marshall, who first saw Indus seals in the British Museum before he came to India in 1902, even though he would eventually announce the discovery in 1924. If, for a minute, we place this long timeline within the larger world of breakthroughs and discoveries, an idea that is frequently mentioned is that of 'the slow hunch'. Joseph Priestley is an example of this. Priestley, in showing that plants create oxygen, was actually building upon an insight that dated back to his boyhood. The young Priestley apparently trapped spiders in glass jars in the belief that 'there was something that was interesting in the way that organisms perished when you sealed them in closed vessels, something that pointed to the larger truth'. The important point was to keep the hunch alive at the back of his mind, which eventually bloomed some two decades after he began thinking about perished spiders in sealed containers.

If we think of the Indus discovery, Priestley's slow building up around an early inkling is evocative of Marshall' s sense about pushing back the antiquity of India–an idea that was incubated in his mind for a long time. Marshall's, in fact, is a classic case of 'the slow hunch'.

Here was an archaeologist who had since the early 1900s, intuitively imagined that there was an unknown canvas which preceded what was then considered to be the beginning of the subcontinent's historical past. We know about Marshall's intuition because in 1903, when he deputed an ASI official, Hirananda Shastri, to survey sites where copper hoards had been found in North India, he talked of the possibility that they may belong to the 'Bronze Age'. At that point, nothing was unearthed to substantiate this connection and it was only in 1924 that the reality of a literate 'Bronze Age' was firmly established. But as early as 1903, Marshall was willing to think of India's antiquity going back to that time.

In the same year, 1903, other clues about an unknown segment of Indian history were unearthed from Baluchistan by Hughes Buller. Best remembered as the compiler of the district gazetteers of Balochistan, Buller also saw himself as an amateur archaeologist and, in 1903, he wrote to Marshall about polychrome bowls that a member of his staff, Mirza Sher Muhammad, had found at a site called Nal. When photographs of the Nal pottery reached Marshall, he immediately declared that if other objects were discovered, there could be a real possibility of having gotten back to a date which was as yet unrepresented in the north-west by any antiquities.

Retrospectively, these are very interesting observations. First, his reaction to link Nal with the Mediterranean makes sense in terms of his background. He had received his field training there. Second, his intuition that it would push back the existing chronology of Balochistan has proved to be correct. Nal is today recognized as part of the background to the birth of Mohenjodaro and Harappa. It is even older than Marshall had imagined it to be.

So, Marshall's teething years saw the discovery of clues which he recognized as being unrepresented in the narrative of 'Ancient India'. The clues, it also has to be admitted, were not pursued with any degree of urgency. Take Harappa, whose seals Marshall was familiar with. We know it was only excavated in 1921. Yet, Harappa was a place that he had considered for a dig many years before the planned dig unfolded. Marshall had actually wanted the ASI to acquire the mounds in 1907. The Deputy Commissioner of the area in early 1908 wrote to say that the mounds could be bought from the owners for a little more than 4000 rupees.

This was roughly one-fourth of what the government usually spent per year on excavations across India. Before finalizing the purchase, Marshall wanted some kind of archaeological feasibility report prepared (three such reports would be prepared from 1909 to 1914). This informs us a great deal about the constraints within which field research had to be undertaken in British India, where non-commercial government departments worked on very small budgets.

So, the interest in Harappa and its intriguing seals faced extraneous challenges and constraints. It was not only a matter of sustaining his intuition, as is often the case with scientists pursuing hunches, but doing so amid inadequate departmental budgets and job uncertainty. One reason that Marshall' s hunch regarding Harappa reached fruition years was due to these constraints.

That Harappa remained on Marshall's mind, even as circumstances unrelated to archaeology put its excavations on a back burner, can be explored a little further. In 1914, there were all indications that Harappa would be excavated within a year. A senior officer of the ASI, Harold Hargreaves, wrote his report on Harappa recommending excavation and provided the first photographs of the site. But again, excavations did not take place.

The reason was the Great War, which began in 1914. Its outbreak led to a massive war effort on the part of British India in the form of money and men. In the ASI, there was now a palpable crunch. Ongoing excavations were suspended in some instances, and a moratorium on new excavations was announced and many officers including Hargreaves decided to fight in the war. So, once again, it was political events related to a theatre of war far removed from India that further slowed the process of pursuing the clues from Harappa.

It was in the place of Hargreaves that Daya Ram Sahni was brought in, the archaeologist whose name we associate with that crucial excavation of Harappa in 1921. However, instead of looking at Sahni's excavation, let us stay for the moment, with the war years, since in adjacent Rajputana, another trail becomes visible around this time.

This concerns the path of a scholar of languages from Italy, Luigi Pio Tessitori, who had been spiritedly scouting around the desert states of Jodhpur and Bikaner. It was this Italian who would go on to explore and excavate the Kalibangan mounds in Rajasthan, which like those at Harappa are now regarded as containing the remnants of a city of Indus antiquity. Tessitori is worth highlighting because his contribution was little known.

Tessitori was an accomplished linguist whose degree thesis was on the 'Rama Katha' and involved a comparison between Valmiki's *Ramayana* and the *Ramacaritamanas* of Goswami Tulsidas. While in Italy, Tessitori had become intensely keen to get a job in India and was in touch with various authorities—on the one hand, with Vijaya Dharmasuri, an extraordinary

Jaina Acharya who was also well known to European scholars, and on the other hand, with the India Office, hoping that the latter would give him a job as a teacher of Latin, Greek or Italian in a college or school which was nearest to Rajputana.

With Vijaya Dharmasuri, he was to subsequently build up a very close relationship—Tessitori considered him to be his *Parampujya Guru*. He also later wrote his biography and, through him, got a direct insight into Jain monastic life. But it was on the recommendation of George Grierson, the Irish Indologist who directed the *Linguistic Survey of India* that he was appointed to work on the Bardic Chronicles of Rajputana. These had been collected by the Asiatic Society of Bengal. In April 1914, Tessitori reached Calcutta to begin his work on them. However, he soon realized that the collection was made up of poorly copied manuscripts and so he proceeded to Jodhpur to begin his field work. From 1916, however, his funds for this project were halved. At this point, the ASI stepped in to support him financially and in return for their support, he toured Rajputana in search of antiquarian remains.

Bikaner was perhaps, of all the states in Rajputana, the one in which conditions for archaeological exploration were most unfavourable. The distance between one village and another, and the imperviousness of the vast tracts of loose sand to all means of conveyance but the camel—these are some of the conditions that Tessitori talks about. But this was compensated by the discovery of an extremely interesting archaeological field. Along the bank of the Ghaggar, Tessitori documented large mounds of which Kalibangan is the one of intrinsic interest to us. He excavated it and found all kinds of materials, including structures and artefacts, mentioned in his report to the ASI. More important, perhaps, is what he did not mention but had found at the site—long stone blades, seals and pottery.

The juxtaposition of artefacts, pottery along with stone blades and Indus seals—was exactly what Cunningham had found at Harappa and undoubtedly if Marshall had known about them, he would have realized that this was a new type of culture that stretched from Harappa to Kalibangan. So, how is it that this did not become public knowledge? It is possible that Tessitori decided to discreetly keep silent about them until he had sorted out their age and context for himself. He, of course, already had a sense that these were prior to whatever was archaeologically known about the historical period. So, there is little doubt that Tessitori was as much a forerunner in unearthing an Indus city in Rajasthan as Cunningham was in the context of Harappa. Perhaps, much more so, because unlike Cunningham who considered Harappa to have been the locale of a Buddhist establishment during the time of Hsuan Tsang, Tessitori's first thought was to place his discovery within prehistoric parameters.

But Cunningham, in many ways, was more fortunate than Tessitori. He lived to publish his account of Harappa and thus, he made known his presence to those of us who have an interest in Indus cities and the story of their discovery. The story of Tessiori's trowelling of Kalibangan, on the other hand, is little known, because, before he could put together his observations for publication, an unfortunate turn of events came to unexpectedly swamp his life.

It all began in 1919 when, within a month of his completing the tour during which he had revisited Kalibangan, Tessitori left for Italy because of his mother's illness. His mother had died by the time he reached Udine, but he decided to stay there for a while. While in Italy,

he did share the information about the seals with one person—George Grierson, his old mentor. Grierson's opinion was that the seals were of extraordinary interest, which he thought were similar to Chinese inscriptions on bone, an opinion that Tessitori did not agree with. Grierson advised that he should get Marshall's permission to publish them in the Journal of the Royal Asiatic Society of Great Britain and Ireland, and it seems that Tessitori intended to do that as soon as he returned to India. However, his return journey proved to be a fatal one. He contracted Spanish influenza on the ship and within a few weeks, he died of double pneumonia on 22nd November 1919. He was buried in Bikaner, not far from his patron and friend, Maharaja Ganga Singh's fort. It is said that even now, on the anniversary of his death, scholars gather at his tomb. Many of them must remember the loss that philological scholarship suffered on that day, decades ago. But only a few mourn the fact that it was an unforeseen ending to the beginning of what could have been a major tryst with all things Harappan. This is because when Tessitori was buried at Bikaner, the knowledge of the Kalibangan seals was also buried with him. This is why they did not figure in accounts of the discovery of the Indus before I wrote my book.

To return now to Sahni, it was his excavations there that succeeded in establishing the existence of a city older than any other then known in the Indian subcontinent. The seals were shown to be of 'pre-Mauryan antiquity', meaning they belonged to a period prior to the last quarter of the fourth century BCE. At the same time, in an optimistic yet cautious assessment, Marshall noted that fifty feet of unexcavated deposit still remained, which could lead to even more valuable discoveries. But soon after this, there were unexpected breakthroughs. The cast of characters becomes wider and to understand how this unfolded, we have to move from Harappa in Punjab to Mohenjodaro in Sindh.

Unlike Harappa, there was no slow hunch or even a prior understanding that the excavations (which began in December 1922) would yield dramatic evidence. Those excavations had nothing to do with Marshall's planning, either. An officer who headed the Western Circle of the ASI, Rakhaldas Banerji, for many years had been keen to excavate it, believing that it was an important Buddhist site. So, as he went to excavate it in the winter of 1922, he was actually headed towards Buddhist Mohenjodaro. Naturally, he began by concentrating on the stupa site that dominated the ruins. It was in the course of clearing the debris just below the eastern retaining wall of the high platform on which the stupa was built that unexpectedly, one of his assistants, N. S. Chikte made the momentous discovery of two inscribed seals. Banerji, immediately realized that these were inscribed with characters that were similar to the Harappa seals. Mohenjodaro, though, was several hundred kilometres to the southwest of Harappa, and it certainly meant that Harappa was not a unique site and that what was being revealed was a distinctive culture. It was this – that he had found and recognized seals of the Harappa type – which would later become the reason why, in the story of the discovery of the Indus civilization, he would always be considered an important protagonist.

For the moment, though, it was some three months after the seals were found that Banerji in March 1923 decided to touch base with Marshall and send him word of his finds. Marshall, for his part, was full of enthusiasm and asked him to try and establish its chronology - to see whether Mohenjodaro was pre-Mauryan as Sahni seemed to think Harappa was. He also

advised Banerji to try and give an indication of the cultural connections of the people who produced the seals. Marshall himself could not do much immediately because he was leaving for England on long leave.

In the world of science, it is fairly commonplace to speak of a discovery being a consequence of a chance finding or an unexpected occurrence. This is exactly what happened in the case of Banerji's excavation at Mohenjodaro. However, a lot depends on whether the concerned researcher can take advantage of what has been unexpectedly found. As historians of science have pointed out, scientists initially build experiments which frequently capture unknown and unexpected processes. They then attend to these results, giving explanations, supporting them with analogies to very similar results obtained in other experiments.

If the unexpected results continue despite changes in methodology, they form new models and theories. If this is juxtaposed with matters as they unfolded after the discovery of the Mohenjodaro seals, it seems that Banerji was hesitant to visualize a new framework on the basis of what had emerged from there.

His search for its cultural connections eventually boiled down to finding a place for the seal makers within the early spread of races—an exercise which had much in common with the views of British historians working on India who constantly used a paradigm in which India's ancient past was marked by races and civilizations being brought into India. The man from Mohenjodaro, to put it another way, was thinking of his discovery in terms of a framework that was unlikely to lead to any new way of visualizing this unknown culture. That is with regard to Banerji. What about Marshall? Interestingly, Marshall, on his return to India later that year, did not visit either Mohenjodaro or Harappa, and instead proceeded to Taxila, the city which he excavated for over two decades. In this, of course, he was following the routine to which he had religiously adhered since he began digging Taxila. At the same time, Marshall knew that the field season of 1923–1924 was an unusual one. It was on his instructions that Mohenjodaro and Harappa were being excavated in quick succession. Yet he did not break routine to get a first-hand glimpse of the excavations. This was perfectly in character, but it is entirely possible that if he had done so, the discovery of the Indus civilization might have occurred earlier than the autumn of 1924.

What eventually pushed Marshall to try and come to grips with the enigma of these two sites were the connections that one of his junior officers, Madho Sarup Vats, wrote to him about in April 1924. Vats had just completed a four-week season of excavations at Mohenjodaro, and it was he who first pointed out that the similarities that existed between the two sites extended beyond dates and seals. This was something that no excavator had highlighted. His letter is worth quoting in some detail:

> *The presence of dull, creamy-coloured flint scrapers, and the blocks from which they are chipped, together with the general absence of coinage, as well as the negative evidence regarding iron, of which not a single piece was found, indicates that the site is very old. Further, it would go a great way to establish the cultural affinity of Mohenjo-Daro with Harappa and their lying in one and the same zone of influence when we remember that not only the size of bricks is the same, but the essential bond between the so-called seals from*

the two places – the strongest and the most valuable link, as well as the crude caricaturing of the terracotta figurines, earthen bangles, balls for slings etc. are found essentially to be of a kindred nature.

Marshall had not seen either of the sites but that summer, Vats' letter forced him to break the routine and begin coming to grips with the riddle that the relics of Mohenjodaro and Harappa had thrown up.

Marshall reckoned that the only way to come to grips with the situation was by simultaneously comparing the material, in conference with those who had worked there. So, he quickly decided that the conclave of concerned archaeologists and artefacts would assemble in Simla, the summer capital of the government, and the place where his head office was located. By June, masses of material had reached Simla, so the task of comparing and correlating the bulk of the collections of the two sites could now begin. For the men who gathered there, this must have been the most exciting archaeological examination of their lives.

The pottery, the stone knives, the seals, the stone beads and so much else from the two sites were strikingly similar. The only person to have until now articulated the presence of an overarching archaeological identity was Vats. Surveying such similarities for himself, though, was for Marshall different from reading about them. For many years, Marshall had pondered the possibility of finding antiquarian remains of an earlier age than what the Survey's excavations turned up. Now, unexpectedly, his officers had reclaimed one such culture. They had reclaimed it from under the alluvium of the Indus plains, where it had been waiting, as it were, to script a new story.

That it was a meeting of concerned archaeologists in the company of artefacts and antiquities which resulted in the recognition of a city civilization in India is worth pondering. Among scientists, laboratory meetings are extremely common. This is where scientists think and reason with each other. In the case of the ASI of colonial India, on the other hand, there was no institutional space where archaeologists associated with it discussed their digs or sought information about each other's field work. It is unlikely, for instance, that Sahni and Banerji had visited Harappa and Mohenjodaro in each other's company, or that they had mutually discussed their findings. What was common to them was the figure of Marshall to whom they addressed their letters and queries. There was no tradition of face-to-face brainstorming. If there had, on the other hand, been a mechanism which allowed ideas to converge and collide, possibly the pace of the flow of 'information and inspiration' would have been far faster. It is thus not merely fortuitous that it was at a big meeting of minds and matter in Simla in the summer of 1924 that the enormity and uniqueness of what had been discovered at Mohenjodaro and Harappa were first understood.

In the world of innovations and discoveries, the importance of the free flow of ideas and opinions is further underscored by what followed Marshall's announcement of the discovery of the Indus civilization. In England, scholarly readers of the 20th September issue of *The Illustrated London News* who reacted instantaneously. Among those was the linguist AH Sayce, who immediately dashed off a note which appeared in the news magazine on 27th September.

There, he wrote that the finds were even more remarkable and startling than Marshall had supposed. While Marshall's dating was provisional and certainly not beyond the first millennium BCE, Sayce pointed out that seals of the type found at Mohenjodaro and Harappa had been discovered at Susa in a context dated to the third millennium BCE. 'It is evident, therefore', as he put it, 'that as far back as the third millennium BCE, there was contact between Susa and north-west of India'. In this way, the announcement of the discovery of the Indus civilization led immediately to the unexpected uncovering of an entirely new dimension of it as it appeared in a widely read publication and, importantly, was read by scholars with experience in matters of ancient scripts and sites in Asia. The networking of knowledge in London thus appears to have been as crucial as it had been in Simla.

After this, the spadework of various archaeologists began revealing the spread of the Indus civilization from Baluchistan to Bahawalpur. Alongside, very large and busy digs at Harappa and Mohenjodaro began. The first set of volumes on Mohenjodaro were published in 1931, while the Harappa excavation report was published in 1940. In both instances, the results published were distilled accounts with a wealth of detail that provide a fascinating window into the splendid character of those ancient cities across a substantial chunk of time. You could be forgiven for thinking that everything that needs to be known about those digs is contained in these volumes.

Almost everything worth knowing would be a more accurate claim. That is because there are little known facts hidden in the archives relating to the 1920s digs that offer information qualitatively different from what is available in the published tomes. One example worth mentioning relates to the labour there. Local labour at Mohenjodaro was supplemented by workers brought in from elsewhere. The rates of pay depended upon domicile, gender, and age. Child labour was common; local labourers were paid at a per day rate of 11 annas for adults, and 8 annas for women and children. For those who came from Karachi, the men were paid at 14 annas, the women 11 annas, and children 8 annas. Many of the labourers were from the north-west region. *The Times of India* described this workforce as follows:

> *At its head is the Director-General of Archaeology; its members form a cosmopolitan family of Sindhis, Balochis, and Pathans; and its territory boasts a thousand acres of rolling mounds and prickly scrub. All day long, from early morning to the sun set, the thousand inhabitants of this strange settlement spend their time digging with picks, spades, shovels and knives. Yet, though they are diggers, they are neither gardeners nor farmers — they are, in fact, makers of history; or perhaps, more accurately, discoverers of history. For this happy family of diggers is making the lonely, monotonous sands of Sind tell the tale of their past, reveal the civilizations they once sustained, and disclose the nature of the people who once trod their dusty paths.*

Empathetic accounts of labouring life are not to be found in archaeological publications, so it is nice to get a newspaper's report vividly capturing what visitors would have encountered in this remote and sandy space.

In these field seasons across Punjab, Sindh and Balochistan after the discovery of the Indus civilization, the one officer who was missing from the scene of action was Rakhaldas Banerji, the

Mohenjodaro man. Ordinarily, this should not seem surprising since Banerji, as superintendent of the Eastern Circle of the Survey, was far away from northwest India. In fact, in October 1925, he was correcting the proofs of his forthcoming book on the Haihayas of Tripuri in Jabalpur. One of the major shrines near Jabalpur was the Chausath Yogini temple at Bhedaghat, which Banerji was revisiting in order to look at images and accompanying inscriptions and correct the relevant pages of the manuscript where these inscribed idols were described.

It was during this visit that an image of the Buddhist goddess Tara was taken away from the temple, and following this disappearance, Banerji became directly implicated.

The case papers are contained in a printed confidential file of 1927 with the subject 'Removal from service of Mr. R.D. Banerji, Superintendent of Archaeological Survey, Eastern Circle, in connection with the theft of a stone image belonging to the Chausath Yogini temple at Bhedaghat in the Central Provinces'. From this, we learn what happened to Banerji in 1925–26 and the extraordinary circumstances surrounding his departure from the Archaeological Survey of India.

It all began on 18th October when Rakhaldas Banerji, accompanied by Sailendra Mohan Ghosh, a photographer, Vasu Deo, a peon attached to his office, and two local labourers, Alfoo and Mankia Dhimar, came to the temple.

On that day, the image of the goddess Tara was taken away in the presence of the temple priest and carried by Mankia to the Dak Bungalow where Banerji was staying.

When the image was taken from the temple, the pujari did not inform the Mahant of its removal, and the Mahant did not discover that it had been taken away until eleven days later—when an official, the tahsildar from Jabalpur, visited Bhedaghat to inquire whether the Mahant had any objection to the image being sent to the Nagpur Museum. The pujari then informed the Mahant and the tahsildar about the removal of the image.

The Mahant lodged a complaint on 29th October with the Deputy Commissioner, and on 5th November, a letter was sent to Banerji asking whether he had taken the image and, if so, to return it. Banerji replied on 17th November, stating that neither he nor any member of his staff had taken the image from Bhedaghat. The Mahant insisted on a further enquiry, which led to an informal police investigation. When matters became too hot, Banerji himself informed the police that the image had been found in Kolkata by his nephew-in-law. Banerji was suspended and there were many levels of enquiry. Eventually, the Public Service Commission decided to remove him from service with a compassionate allowance amounting to two-thirds of his pension.

The circumstances of Banerji's departure were later relegated to the archives, and it is through one of those inadvertently discovered files that the story has been told here; it reveals what had transpired in his professional life. It also reminds us that, in his case, enormous talent was accompanied by an astonishing proclivity to ignore the possible consequences of his actions, which in this instance were entirely beyond the rules governing officers of the Survey. The dishonour of dismissal from the organization he had served for seventeen years must have been hard to bear. It did not, however, adversely affect his subsequent career. Shortly after Banerji

left service, he was appointed to the Manindra Chandra Nandy Professorship of Ancient Indian History and Culture at Banaras Hindu University in 1928. He died in harness in 1930.

This brings me to the end of this story about how the Indus civilization was discovered and of some lesser-known facts that followed the dramatic announcement of 1924. New discoveries, it must be said, continue to be made and will no doubt change our perceptions of the civilization and of the main characters involved in this narrative.

Harappa @ 100: A Catalogue of Photographs of Excavations at Harappa in 1924-25

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The centenary theme of the conference, the 100th year of the announcement of the discovery of the Indus Civilization, evokes the recollection of one of the first newspaper reports in India of this Bronze Age archaeological phenomenon. *The Amrita Bazaar Patrika* carried a long article about the discoveries at Harappa and Mohenjodaro on 1 January 1925, and noted with rhetorical intensity: "What Indian is there who will not feel proud that the civilization of his country thus reaches up to the hoary age of the third or the fourth millennium BCE". Declaring the discovery as "monumental evidence" of the fact that the Indian Civilization was as ancient as any in Asia, the news report urged the colonial government to liberally finance the excavations, emphasised that the sites were of "national" not "provincial" importance, and suggested that the Archaeological Survey of India "reserves its best energy and funds for the purpose" and "leave off excavations at Taxila, Sarnath, Nalanda and so forth for the time being". Additionally, it berated the Survey for failing to protect Harappa through the Ancient Monuments act, for also not making the archaeological discoveries decades earlier, and asked, rather scathingly, "What were these high paid officers doing for more than half a century? Were they sleeping and snoring till they suddenly woke to find themselves made famous by Assyriologists and Egyptologists?"

The voice of ire against foreign scholars of foreign civilizations meddling with the Indian past, which the news report provides a glimpse of, bespeaks of the resentment that many Indians nurtured at the announcement of the discovery of the Indus Civilization in *The Illustrated London News* by Sir John Marshall, director general of Archaeological Survey of India (1902-28)[1]. As is well known, Marshall's essay on this "prehistoric civilization of

1 Marshall, J.H. 1924. "First Light on a Long Forgotten Civilization: New Discoveries of an Unknown Prehistoric Past in India", *The Illustrated London News* [henceforth ILN], 20 September, pp. 528-31, 548. For Marshall's account of his reasons to publish in the ILN see Annual Reports of the Archaeological Survey of India for the year 1923-24 [henceforth ARASI 1924-25] pp. 48-9; for histories of the publications of grand archaeological discoveries in the ILN to provide them with greater visibility see Guha, S. 2011, 'Photographs in Sir John Marshall's

India', which appeared on 20 September 1924, attracted immediate attention of scholars of Ancient Assyria and Ancient Egypt, in Oxford and London, who immediately put forth their theories about its chronology and cultural affiliations, in the two successive editions of the journal.[2] Notably, on 21 January 1925, Marshall faced questions in the Council of States, New Delhi, for releasing information in a foreign press, and Khan Bahadur Ebrahim Haroon Jaffer, a prominent member of the Council, categorically asked him his motives for doing so. He also asked Marshall whether it was a fact that the "Archaeology Department had refused to provide local papers with copies of photographs which were first published in England, even though the Indian papers had offered to pay for them."[3]

In his reply to Jaffer, Marshall denied any personal knowledge of requests his officers may have received from Indian papers, and stated that had this been in case, they would have refused them in accordance with the standing orders that required archaeological material to be published in the Survey's official reports unless permission to the contrary was granted. The Survey archives, however, tell us that Madho Sarup Vats, who had excavated at Mohenjodaro in 1923-24 and had spoken informally of the finds, and also about those at Harappa, to a correspondent of The Times of India in 1923. They also showed that Rakhal Das Bannerji (the excavator of Mohenjodaro in 1922-23) voiced his discontent the same year on matters related to the Survey's administration. Both, as the archives further document, were reprimanded by Marshall.[4] That Marshall himself was very aware of the heightened sense of nationalism in India due to the discovery of the Indus Civilization is very apparent from his semi-official letters of 1923-24. Writing to the Secretary, Department of Education, Health and Land, on 10 October 1924, he remarked that "Indians might legitimately resent the idea of this essentially national work being delegated to foreigners", and again to him on 11 November 1924 he stated that "Indians have always prided themselves on the great antiquity of their civilization and it has long been their hope that archaeology would furnish tangible evidence to justify their pride."[5] He subsequently emphasised the national importance of the finds in his first official summary of the excavations at Mohenjodaro and Harappa in the annual report of the Archaeological Survey of India for the year 1923-24, and declared that they allow India to "take its rightful place, along with Mesopotamia and Egypt", as an area where "civilizing processes were initiated and developed."

Archaeology' in S. Guha (Ed.) The Marshall Albums: Photography and Archaeology (Alkazi Collection of Photography and Mapin), pp. 166-7.

2 7 September 1924, "Professor A.H. Sayce on the Remarkable Discoveries in India" (A.H. Sayce, ILN, p. 566) and 4 October 1924, "The New Links between Indian and Babylonian Civilizations" (C.J. Gadd and S. Smith, ILN, pp. 614-6).

3 Part B of Proceedings of Department of Education, Health and Lands, Archaeology and Epigraphy (henceforth A&E) Nos. 149--52, June 1925. See for details about the follow up of Marshall's 1924 publication in The Illustrated News, Guha, S, 2011, pp. 165-6. For details of Ebrahim Haroon Jaffer's career, see ibid, p. 177 footnote 64.

4 'Disciplinary Measures against Mr. R.D. Bannerji', Part B of Proceedings of Department of Education, Health and Lands, A&E, pp. 1-4, 27-9, February-March 1923.

5 D.O. letter no. 609-5782 and 609-309/0/4712, File 839/1925. Survey Archives [now in the National Archives of India, New Delhi]

The above recollection about the announcement of the Indus Civilization reminds us of two things:

1. Unlike the other Bronze Age civilizations, especially those with colonial histories of scholarship, the Indus has remained subjected to strong nationalist claims of territorial and cultural ownerships since it was first brought to light in the modern world through excavations at Mohenjodaro and Harappa in the early 1920s. Thus, this Bronze Age phenomenon has also served the cultural politics of decolonisation in India and its shifts and transformations over seven decades.
2. That the photographs from Harappa and Mohenjodaro came to be uniquely valued as objects of history. Moreover, claims for their access and their uses and circulation allow a glimpse of some of the ways in which vision transforms excavated objects into material evidence.

Notably, the hypotheses of "links between the Indian and Babylonian civilizations" were shown to be true by Cyril and Sydney Smith (Egyptian and Antiquity section of the British Museum, London) through a photographic display. They placed photographs of similar looking objects, from Ur, Al Ubaid, Susa, Harappa and Mohenjodaro next to each other to allow readers to see the "extraordinary parallels between various objects found on the two Indian sites (Harappa in the Punjab and Mohenjodaro in Sindh) and Babylonian objects already known" and thereby, to "trace these interesting comparisons". They also emphasised the resemblance as "very striking when pictures of various classes of objects are seen side by side".[6] The display fixed the value of equivalency to, albeit, similar looking but different artefacts from different sites and different geographical areas.[7] Such displays show us why the evidential power of photographs lie upon expectations of their performance, and demonstrate one of the most common ways in which things get transformed to facts.

This presentation opens with a reflection on an early visual history of the Indus Civilization, serving as a prelude to a curated collection of photographs from the 1924–25 excavations at Harappa, recently catalogued for *harappa.com*. Gratitude is due to Omar Khan for sharing access to this collection and for his generous efforts during the Christmas and New Year period in reviewing the entries and publishing the initial set.

The photographs now appear poised to narrate the story of the 1924–25 excavations, when the Bronze Age city of Harappa began to emerge with visual clarity. Thanks to the sustained efforts of Omar Khan, photographs from the Harappa excavations of the 1920s and early 1930s are being systematically researched, catalogued year-wise, and made accessible through Harappa.com, the website he founded in 1995. The preliminary cataloguing of materials from the 1924–25 excavation, highlights the imperative for deeper inquiry into the role of archaeological photography—not only as documentation but also as a means of recovering

6 In Gadd and Smith 1924, ILN, p. 615. The title of the display: "A New Historical Vista": Close Indian and Babylonian Parallels. Photographs of Indian Objects by the Archaeological Survey of India, Western Circle, By courtesy of Sir John Marshall, Director General of Archaeology, India. Photographs of Babylonian Objects specially taken for "The Illustrated News" By Courtesy of the British Museum".

7 Reproduced in Guha 2011, p. 87.

the layered histories of field encounters that shape archaeological knowledge. As recordable and reproducible objects, photographs carry multiple meanings and contested histories. They compel reflection on questions of visual ownership and representation within archaeological practice. In this context, the photographic archive of the Harappa excavations invites a critical reassessment of the visual historiography of the Indus Civilization, revealing the ways in which such imagery has been mobilized to align with evolving scientific narratives about the origins and ancestral heritage of ancient India.

I

The Harappa excavations of 1924-25 marked Daya Ram Sahni's last dig at the site . The excavations were carried out between 6th December 1924 and 6th April 1925, and the sum expended upon them was considerably larger than the previous season, Rs. 13000 compared to Rs. 3000 in 1923-24. Mohenjodaro was excavated by K. N. Dikshit and "valuable sidelights of the Indus culture" were sought through an expedition to the "archaeologically unsurveyed land" of Balochistan,[8] to trace the antecedents, and as well as through "an experimental aeroplane survey" over "some fifty miles of the old bed of the Ravi, on which Harappa stands". Both illuminated the promising archaeology of the Indus Civilization, which was aptly noted by Marshall as "how almost limitless [is] the field awaiting the excavator."[9]

Undoubtedly, the international attention, which the Indus Civilization received following Marshall's publication in *The Illustrated London News* contributed to the efforts of the 1924-25 excavations at Harappa and Mohenjodaro, to know the sites better. At Harappa, Sahni continued digging areas he had previously excavated (1921-22 and 1923-24) "at the low mound F… and the lofty mound A-B" that rose abruptly to its south, and reported that the buildings brought to light that year were somewhat better preserved than those that had been exposed earlier.[10] Sahni extended excavations in Mound F through trenches Ae, Ai and Af, and from the middle of this mound traced an area of parallel walls. He noted the find, which was subsequently identified provisionally and mistakenly as the Great Granary, as the "most important architectural discovery … of the year."[11]

In mound B, he excavated four pits, and exposed a "well preserved drain of bricks with a gable roof", and a temple like structure with stout brick walls.[12] Notably, Sahni reported wide scale funerary practices in both mounds, and this reference appears in retrospect, anticipatory of the Cemetery uncovered four years later, although in a different mound H, by Madho Sarup Vats, in 1929-30.

A series of photographs provides a view of the exposure, and thereby unfolding, of the area of parallel wall, trench by trench, both horizontally and vertically. Sahni noted that he "was led to

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8 Hargreaves, H. 1927. Explorations, Frontier Circle, Annual Report of the Archaeological Survey of India 1924-25 [henceforth ARASI 1924-25] pp. 50-60, p. 55.

9 Marshall, J.H. 1927. 'The Prehistoric Civilization of the Indus', ARASI 1924-25, pp. 60-3, p. 60.

10 Sahni, D.R. 1927. 'Explorations Northern Circle', ARASI 1924-25, pp. 73-80, p. 73.

11 Ibid, p. 76.

12 Ibid, p. 79-80.

the examination of this portion of the site by the existence of two solidly built walls running parallel to each other without any party walls ... With these walls as a starting point ... (his) operations continued to reveal, in quick succession at narrow intervals, wall after wall, until (he) had a series of 14 of them, all running parallel to each other and of the same length".[13]

He further observed that "these walls exhibit two distinct types, namely, a stouter kind and a thinner type and had it not been for the thin walls, which intervene between the thicker ones, it might have been thought that the latter enclosed a series of spacious rooms".[14]

Significantly, while describing Sahni's findings in The Prehistoric Civilization, before the publication of excavation reports of Mohenjodaro and Harappa in the Annual Report of the Archaeological Survey of India 1924-25, Marshall described the area of parallel walls as a "large edifice".[15] However, Sahni's description of the area prevailed until the excavations at Harappa were over, in 1936. It was retained by Vats, who excavated the site after him in the years 1926-27, 1927-28 (when over 3000 antiquities were recorded and more than 3,00,000 cubic feet of earth was moved), 1928-29 (when traces of a common foundation wall of the eastern series of the parallel walls was found), 1929-30 (when he excavated Cemetery H), and continued until 1934, by which time he had also found workmen's quarters in Mound F.[16] The description of this area as the Great Granary first appears in Vats's definitive report of the Harappa excavations (1940), and he attributed this to Marshall. Vats mentioned a letter from Marshall dated January 1933, during which Marshall, on a visit to England, had seen a granary of the Roman-Era.[17]

It is here that Vats recorded the "most remarkable and the largest building at Harappa" as "the Great Granary", and provided a description of "this extraordinary complex", based upon suppositions, "not without reason" that the building had long corridors with large halls that had timbered floors. He reflected Marshall's view in declaring that "when there was no currency and taxes had to be paid in kind, the public treasury must have taken the form of great store houses which are known from other countries as well, such as the long and narrow store houses attached to the Minoan palace at Knossos and Phaestus at Crete."[18]

Marshall's premise of a large edifice when describing the area of parallel walls in the Annual Report of the Archaeological Survey of India (1924-25) undoubtedly reflected his expectations of finding, to quote Vats, "the long and narrow store houses" of the Minoan Palaces", which he had seen during his archaeological training in Greece in 1898 and 1900.[19] His visit to a

13 Ibid, p. 79-80.

14 Ibid

15 Marshall ARASI 1924-25, p. 62.

16 Harappa was excavated until 1936, although the funds for excavations were drastically reduced from 1932 due to retrenchment. The 1934-35 excavations were supervised by M. Nazim, and the 1935-36 by M.H. Kuraishi.

17 Vats quoted Marshall's letter extensively. See M.S. 1940. Excavations at Harappa: Being an Account of Archaeological Excavations at Harappa Carried out between the Years 1920-21 and 1933-34, Vol. 1, p. 16.

18 Ibid, p. 15.

19 See Guha 2011, p. 232.

Roman Granary in Britain in 1933, clinched his view of a granary at Harappa, and the inference illuminates how visual memories and theories of what a city and civilization should contain guide expectations of what to look for and seek through archaeological excavations.

II

Photographs of Harappa during Marshall's tenure as the head of the Archaeological Survey, invariably, remind us that these images, along with those from Mohenjodaro were used effectively by Mortimer Wheeler, the last British director general of the Survey (1944-48) to highlight the many errors in his predecessor's excavation methods and flaunt his own, ostensibly, scientific field practices, which he claimed to have introduced to Indian archaeology.[20]

Two series of photographs from Wheeler's excavations at Harappa, in 1946, one showing the removal of a skeleton (Grave 5) from Cemetery R 37 to the site museum, and the other the removal of trench baulks, present the ways in which Wheeler employed photography to show off the systematic precision of his excavation techniques and, thereby, the accuracy of the evidence he unearthed. Wheeler's approach "entailed visual discipline in the way fieldwork was conducted, photographed, and analyzed to create archaeological arguments", and his injunctions of excavation photography, "straight lines, attention to detail, and orderliness served both archaeologists and photographers alike." [21]

The embeddedness of the visual in the undertaking of field work, including the methods, draw our attention to the skills of visualising that is required from archaeologists. Notably, many have been remarkable illustrators, and like Wheeler, have sought to improve their skills in drawing and draughtsmanship.[22] We see the valuation of visuality in one of the earliest books on the Methods and Aims in Archaeology by W.M. Flinders Petrie, 1904. This vision has also guided the decoding of meanings for things that are excavated as 'unknown' or, like the Great Granary, deemed subsequently as wrongly known.[23]

Unlike the photographs of Wheeler's excavations, those taken under Marshall's command rarely show the actual work of digging, clearing and sorting. Very few include indicators that direct the eye in distinguishing the stratigraphic breaks or the chronological levels that were reached. Moreover, Marshall, unlike Wheeler, made no explicit claims on photographs to justify the quality of his excavation methods. Yet, by arranging selections of excavation photographs from Harappa, such as the clearing of the area of parallel walls, and from excavations at Mohenjodaro (see Slide 9), it becomes possible to create a narrative of the gradual elimination of pictorial 'chaos'. In this

20 For a critical account of Wheeler's excavations in India and his photography of them see Guha, S. 2003, 'Mortimer Wheeler's Archaeology in South Asia and its Photographic Presentation', South Asian Studies, Vol. 19, pp. 43–55

21 Riggs, C., 2020. 'Archaeology and Photography', in G. Pasternak (Ed.) Handbook of Photography Studies, Routledge, pp. 187-206, p. 196.

22 Cf. Guha, S. 2013. 'Beyond Representation: Photographs in Archaeological Knowledge', in O. M. Abadia and C. Huth (eds.) 'Speaking Material: Sources for the History of Archaeology' Complutum, Vol. 24 (2), pp. 173–88.

23 This is considered a Great Hall at present, and its function, determined through seeing and inferencing, is tentatively identified as a place for dyeing.

respect, the photographs from the excavations at Harappa, taken between 1920 and 1936, allow a glimpse of the 'evolving' genre of excavation imagery. But we need to remember the genre itself is contingent upon what we fix as representative samples.

Regardless of the aims behind documenting processes of field work, the Harappa photographs of 1924-25 illustrate the aims of precisely presenting the objects unearthed.

Thus, many are shown in-situ, emerging from the ground. We also see the scale in many, reminding us that this tool and its correct positioning became the defining parameter of an archaeological image from the 1940s. The photograph of a cane, most likely of a superintendent archaeologist standing nearby, as a scale reference for the excavated pot, also provides a view of archaeological imagery.

III

The 1924-25 Harappa photographs appear in Punjab volumes nos. 31 to 33. The collection in albums has aided their upkeep, and reminds us of Marshall's singular effort in creating the DGA's photographic collection in 1904, through which he also successfully documented his own and his Survey's achievements. This collection, as shown elsewhere, along with the photographic archives of the provincial circles that were created concurrently, fashioned the forms and possibilities of archaeological knowledge.[24]

The DGA's and other photographic collections which Marshall instituted, and the photographic collection of Indian architectural and archaeological surveys, which was established in 1869 for the India Office (now in the British Library),[25] show clearly why encyclopaedic repositories of photographs establish disciplinary epistemologies, and how practices of collecting, cataloguing and archiving inform of things that appear unrelated to such acts, including of nation- and region-making.

The Punjab albums also remind us that Marshall donated a comprehensive collection of photographs taken by photographers of the Archaeological Survey during his tenure in the organisation of monuments and excavations, to Cambridge, his alma mater. In 1954, all the albums in this collection, around 63 of them, were sent to Durham University, which was poised to begin a new course on Indian archaeology.[26] Expectantly, the uses of this deemed to be 'teaching collection' that would inform the pedagogy and reception of South Asian archaeology in the early years of decolonization.

The list of photographs that appear towards the end of the ASI's annual reports from 1904, usually in the sections Department and Routine Notes and Appendix, show that by the 1920s photography embedded a chain of on-site recording techniques, so that successful negatives were registered in much the same way as artefacts found in the course of excavations. Regarding the photography of the Harappa excavations of 1924-25, we are informed that over 105 negatives,

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24 Cf. Guha 2011, pp. 145-52.

25 For details see ibid, and Guha, S. 2024, Technologies and Epistemologies in the Early Photography of India's Monuments, in S. Guha [Ed.] Histories in the Making: Photographing Indian Monuments 1855-1920 (DAG Publications), pp. 9-71, pp 37-47.

26 See Guha 2011, pp. 152, 249.

of views of excavations were exposed by the superintendent. Hindu and Buddhist Monuments, Northern Circle, and 36 photographs of antiquities were included in the DGA's collection.

IV

While cataloguing the Harappa photos, we get a glimpse of some of the differences in views between Sahni and Vats, and thus of conflicts between the Indian officers of the Survey. Sahni recorded overwhelming evidence of funerary practices in 1924-25, and declared that the excavations at Harappa have yielded overwhelming evidence of the fact that the ancient inhabitants, with whom he considered our ancestors, invariably cremated the dead and no traces of the several kinds of burial practiced by the ancient Mesopotamians have yet been found anywhere on the site. According to him, the Harappans first burned the dead on a funeral pyre and then deposited part of the cremated bones in earthen vessels or brick structures resembling modern-day samadhis."[27] Notably, Marshall upheld Sahni's views in his summary of the excavations of 1924-25, and mentioned the samadhis as a unique find.[28]

Sahni's finds of several sepulchres and cremations in both Mound F and AB, were all, however, denounced by Vats, as he began excavating Harappa. In his formal report of the Harappa excavations he declared, emphatically, that "My experience, based on much larger operations at this place, is that Harappa—specially in the later strata—is so full of bones that they come out in greater or lesser quantities, wherever the mounds are dug, due no doubt to the fact that the inhabitants depended a great deal on animal food, perhaps, to an even larger extent than did the people of Mohenjo-daro... Perhaps, I may also add that in the large area which has since been excavated on this and other mounds at Harappa, not a single sepulchre has so far been met with. It is highly improbable that cremation platforms or funeral pyres would have been made in the midst of dwelling houses all over the site."[29]

"In the large area which has since been excavated on this and other mounds at Harappa, not a single sepulchre has thus far been encountered. It is highly improbable that cremation platforms or funeral pyres would have been constructed amidst dwelling houses scattered across the entire site." We also note the different descriptions by Sahni and Vats for a strikingly unique object that they found in the area of the parallel walls in 1924-25, and published as a double-headed bust of a terracotta lion in the year's annual report [Plate XXVII (f)]. The description followed Sahni's. Vats, however, recorded it as a jugate terracotta tiger head, and stated that the two holes on the head were for fixing horns. He saw this "chimera creature" to be a horned tiger, as it looked similar to a representation of "the triple interlaced tiger seal" of Mohenjodaro, and suggested that this was a cult object of worship. "The duplication of heads being intended to increase at once the prowess and sacred character of the beast."[30] Additionally, we note discrepancy in recording this object. Its find number in Sahni's report is A 813. In Vats, it is A 815. This may be a careless lapse. The object forms a part of the 'partitioned objects' and came to India's share, as also the terracotta birdcage

27 ahni ARASI 1924-25, p. 74.

28 ahni ARASI 1924-25, p. 74.

29 Vats 1940, Vol. I, p. 48.

30 Ibid, p. 308.

(Ab 554), which too was found in Harappa in the 1924-25 excavations. Lions are, reportedly, not found in India, but visitor perceptions of the jugate-head today are worth finding out, especially as Sahni's description appears close to the emblematic attribution of Ancient India's grand imperialism today, as we note from the monumental public statues of the heraldic lion.

Vats also pointed out the errors in the "method of recording followed during the time of the Rai Bahadur". Referring to Sahni's excavations in Area B of Mound A-B, he highlights that Sahni "began by sinking a trial trench ... This trench was extended to a length of over 100 ft., and later on, at right angles to it, he sank two subsidiary trenches." More importantly, Vats underscores the inconsistency in how the depth of the antiquities was recorded—sometimes measured from the highest point of the mound, approximately 590 feet above sea level, and at other times from the ground surface at the findspot, which could be as much as 21 feet lower. This arbitrariness in measurement standards inevitably affects the precision and reliability of the stratigraphic data.[31] Invariably, the pointing of errors in the fieldwork of a peer or predecessor illustrate efforts to show the 'moving on to a better practice'. In this, it informs of the ambitions of aspiring archaeologists to show off the merit of their own undertakings.

However, the differences in Sahni's and Vats's views—particularly the latter's critical stance towards the former's excavation methods—invite a broader perspective beyond the usual framing of conflicts between Indian officers and their British and European counterparts within the Survey, shaped as they were by colonial politics. The archival record shows that Indian officers were also often wary of one another and did not always agree on matters of scholarship, archaeological interpretation, or professional ethics. A revealing example is a letter written by Sahni to Marshall on 20 April 1924, in which he remarked:

"A set of plaster of Paris impressions of the seals found at Harappa will be submitted to you as soon as I return to headquarters. A set of such casts will also be supplied to Mr. Banerji, but I hope he will be good enough to refrain from publishing them until after my own monograph on the Harappa excavations has been submitted to you for publication".[32] Sahni's reference of a monograph is to his report of the 1923-24 Harappa excavations in the Survey's annual report, and this is not the only letter by an Indian to his head about his wariness of a colleague's proclivities to pre-empt and take over his achievement.

V

Going back to the excavations of 1924-25, we note analogies with Hindu religious practices appear often in Sahni's inferences of the structures and artefacts.

Apart from the samadhis, and practices of cremations, he considered a large cone of dark stone found in Mound F, Trench Ae, to resemble a Shiva linga and suggested that it must have been used for worship in what he surmised was a temple—a small structure with stout brick walls and a narrow entrance facing south.[33] Vats subsequently added to such analogies in his report of the

31 Ibid, p. 137.

32 Sahni to Marshall, from Camp Muttra Cantt, 52 Regiment Bazaar, File no. 548, 1924-27 "Excavations at Harappa", Survey Archives.

33 See Sahni ARASI 1924-25, pp. 74 and 79.

Harappa excavations. Thus, for example, he invoked the Hindu belief of sukshma sharira, reaching the Abode of Bliss—a radiating solar world with beautiful stars, birds, fish and flowers for the final rest, to explain the motifs painted on a burial jar of Cemetery H.[34] The inference, but without the indication that it was his, is the object label, which together with the jar is prominently displayed in the Harappa Gallery, of the National Museum (New Delhi), which to a large extent highlights, wrongly, the possibilities of tracing Hinduism in the Indus Civilization.[35] In exploring the Harappa Gallery, we are strongly reminded that the long archaeological scholarship of the Indus Civilization informs us of the array of institutional and cultural paradigms that have mediated its scholarship and excavations.

The exhibition also provides a reminder, if at all needed, that cataloguing and description are not neutral practices. The concurrent display of this Civilization through its types offers a compelling vision of the Bronze Age as a timeless link to territory and culture, creating a hermetically sealed understanding of what constitutes the 'Harappan'.[36]

To come back to the Harappa photos: they cajole us to look for encounters, which the act of photography constitutes. Every photograph bears traces of meetings, the most obvious between the photographer and the photographed, neither of whom can on their own determine how the meeting would be inscribed in the photograph. As Ariella Azoulay has powerfully demonstrated through The Civil Contract of Photography (2008), there is something that extends beyond a photographer's action, and no photographer, even the most gifted, can claim ownership of what appears in the photograph. Photographs bear traces of plurality, and hold within themselves the potential to allow civic negotiations about the subject they designate. In this, as Azoulay also demonstrates, they de-territorialite.

I conclude by drawing attention to this powerful quality of the photograph, for reflecting upon the merit of deterritorializing the Indus Civilization, and weaning it away from the myriad heritage valuations that are endowed upon it, especially for establishing, spurious, historical evidence of the hoary ancestry of the identity politics of decolonisation, and of nation and region making. Perhaps by placing it among its peers, namely, the Bronze-Age civilizations that hemmed around it, just as Marshall and his peers did, we may be able to see the encounters that connected the world of this Age, in the third millennium BCE, and thereby, the irrelevance of the searches of the cultural genealogies of pristine population groups.

34 Vats 1940, Vol. I, pp. 207-8.

35 For an image and critical comment of the display see Guha, S. 2015, Artefacts of History: Archaeology, Historiography and Indian Pasts (Sage). Fig. 5.1 and p. 185.

36 For details see Guha, S. 2019, Decolonizing South Asia through Heritage and Nation Building, FutureAnterior: Journal of Historic Preservation, History, Theory and Criticism, Vol. XVI, No. 2, pp. 31-46.

New Light on Marshall: Exploring the Archaeological Methods, Approaches, and Perspectives of Sir John Marshall Through His Photographic Collection at Durham University

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The Archaeological Survey of India (ASI), under the direction of Sir John Hubert Marshall CIE, FBA, between 1902 and 1928, has been credited with many achievements. These accomplishments include the reorganisation of the ASI for excavations and conservation, the development of the Ancient Monuments Act, and the creation of purpose-built site museums and collections (Guha 2010: 238-245; Hawkes 1982: 231). During this time, the ASI was also responsible for overseeing significant programmes of excavation at sites such as at Taxila, and most pertinently regarding this international conference, at Mohenjo-daro and Harappa, which led to the announcement of the discovery of the Indus Valley Civilization in 1924. Also known as the Indus Valley Cultural Tradition, it stretched across an area of 3,133,886 square kilometres at its peak, and its era of integration is generally agreed to date from circa 2600-1900 BCE, pushing back the region's history by over 2500 years (Coningham and Young 2015: 177-178; Singh 2008: 133).

However, unlike many of the archaeological pioneers of South Asian archaeology from the nineteenth and twentieth centuries, Sir John Marshall published few personal recollections of his time as Director-General of the ASI, and no biographies have yet been written about him (Lahiri 2012: 299). This void was filled by his contemporaries, successors and later generations of archaeologists, such as Sir Leonard Woolley, Sir Mortimer Wheeler and Stuart Piggott, who provided critical interpretations of the methods of the ASI under Marshall's direction, which came to define his legacy.

Other sources are available to reappraise and shed new light on Marshall's impact on, and contributions towards, the development of the discipline of

archaeology within South Asia. These include archives relating to the ASI, as well as material from Marshall's personal collections, some of which were donated to Durham University in the 1950s. Marshall's photographic archives held at other institutions, such as the University of Cambridge, have been described as "artefacts of archaeological practice that endowed archaeology with the values of a unique disciplinary science" (Guha 2010: 30). Similarly, Durham University's collection not only documents archaeological discoveries, but also provides insights into Marshall's perspectives and archaeological methods. Through an analysis of imagery held within Durham University's Sir John Marshall Photographic Collection, particularly those relating to the Indus Valley Civilization, themes including the development of systematic archaeological recording, the dissemination of archaeological discoveries, and influences on archaeological interpretations will be explored.

Durham University's Sir John Marshall Photographic Collection

In the 1950s, Dr and Mrs H.N. Spalding, important benefactors of Durham's fledgling Oriental Museum, encouraged Sir John Marshall to donate images from his personal collection to Durham University. The Museum was delighted to accept the collection and its founder-curator, Professor Thomas Thacker, proclaimed that "The collection of photographs seems a most remarkable one, and one which we shall be lucky to possess" (Thacker 1953). Its range, size and scale is illustrated through Marshall's correspondence to the Spaldings, where he noted that "I have not forgotten the photographs for Durham, and have been making a great effort to classify, and arrange and title them. The task is bigger than I thought; for I had quite forgotten how many and how diversified they were..." (Marshall 1953).

Durham University's Oriental Museum is now home to nearly 5000 images from the personal archives of Marshall. While serving first as Director-General of the ASI (1902-1928) and later appointed Officer on Special Duty, ASI (1928-1934), Marshall collected photographs of excavations, monument conservation, artefacts, sculptures, as well as technical drawings of many sites and monuments across the modern nation states of Pakistan, India, Bangladesh, and Myanmar. Personally selected by Marshall, the composition of the collection indicates the sites and monuments that he identified as significant for study, but also provides a substantial archive of South Asian art, architecture and archaeology dating from prehistory through to the colonial period.

Today, this archive represents an important research and teaching resource that attracts scholars from across the globe to Durham University. It has been central to a number of international collaborative projects and images from the collection have also been used extensively in publications and exhibitions focusing on both South Asian archaeology and the early history of Buddhism. Most recently, it was the focus of an exhibition on the UNESCO World Heritage Site of Taxila, Pakistan.

New Light on Marshall

In 2021, a collaborative team from Durham University's UNESCO Chair on Archaeological Ethics and Practice in Cultural Heritage, the Department of Archaeology and Museums

(Government of Pakistan) and Durham University's Oriental Museum co-curated Taxila in Focus: 100 Years Since Marshall.

Held within Durham University's Oriental Museum and also online as a dual-lingual resource in English (https://stories.durham.ac.uk/TaxilaInFocus/) and Urdu (https://stories.durham.ac.uk/TaxilaInFocus-Urdu/), the exhibition explored the sustained 21-year campaign of excavations that Marshall directed at Taxila's successive settlements of the Bhir Mound (fifth century BCE-first century CE), Sirkap (second century BCE-second century CE), and Sirsukh (second-third centuries CE) as well as Buddhist monasteries. Focussing on photographs from these archaeological investigations, it revealed early interpretations of the site and the developing practice of archaeology in early twentieth century South Asia.

Emergent themes were the uses of photography within the development of archaeology as a systematic discipline, how imagery aided dissemination to the wider public, and also explorations of Marshall's educational background in Classical archaeology.

Within this paper, these subjects will be explored through the collections held at Durham University in relation to archaeological excavations at sites associated with the Indus Valley Civilization conducted by the ASI during Marshall's time in South Asia.

Systematic methods

The ASI under Marshall's direction celebrated some notable successes, including the announcement of the discovery of the Indus Valley Civilization in 1924. Despite these achievements, the reputation and condition of the ASI after Marshall's retirement was viewed as "Lamentable" by the Viceroy of India Lord Wavell in 1943 (Hawkes 1982: 230).

This partly stemmed from Sir Leonard Woolley's report on the ASI (Woolley 1939), which had identified, amongst other issues, that excavation was haphazard and initiated for no good scientific reason (Hawkes 1982: Wheeler 1955: 183). Woolley's report also called for the appointment of an external European Advisor in Archaeology for a limited number of years, and this position was filled by Sir Mortimer Wheeler in 1944 (Wheeler 1955: 184).

In his new position, and likely in response to Woolley's report, Wheeler set to contrast his own programme of work favourably in comparison to those of his predecessors (Guha 2003: 8). Promoting his own systematic approach, Wheeler stated that archaeology in South Asia had been a "parody of scientific method" (Wheeler 1947: 44) prior to his arrival (Guha 2003). On Marshall, Wheeler stated that his "clearance did not conform with modern technical standards" (Wheeler 1954: 151) and "… his lack of technical knowledge or interest led ultimately to the notorious breakdown of the ASI and to the resultant Woolley report of February 1939, so that by 1943 even war could not longer defer some action…" (Wheeler 1976: 11-12).

Although appointed to bring innovative techniques and methodologies to South Asia (Guha 2010: 157), Wheeler argued that Marshall had taken office when archaeological practice was at "a rudimentary stage" (Wheeler 1955: 181) and having begun his tenure as Director-General at such a young age and with little practical experience beyond his few field seasons in Greece, "in excavation his technical standards remained to the end substantially those of Greece

and the Near East in 1900" (Wheeler 1955: 181). Such criticisms were echoed by Wheeler's contemporaries, such as Stuart Piggott, who in his synthesis of Prehistoric India (1950) stated that "... the reports on Harappa, Monhenjo-daro and Chanu-daro... cannot, in all fairness, be said to approach the archaeological standards set in European archaeology by the 1890s, and in common employment since the 1920s" (Piggott 1950: 18).

Despite these criticisms, Wheeler also praised the work of the ASI under Marshall's tenure, stating that "No Contemporary of Marshall's known to me could have left anything like so deep an imprint upon the archaeology of a subcontinent" (Wheeler 1955: 181). The Durham University Marshall Photographic Collection not only documents explorations and discoveries at archaeological sites across South Asia, including the sites of Harappa and Monhenjo-daro, but also provides insights into the development of archaeology as a discipline in the early twentieth century and colonial perceptions of South Asia.

Photographs are not entirely objective depictions, and meanings can be created through how an image is composed. It has been suggested that some of the earliest photographs in South Asia followed a picturesque tradition that had been borrowed from landscape painting. Utilising romantic conventions of depicting ruins, these images have been interpreted as portraying a 'decaying civilization' in need of 'rescue' by Imperial European powers (Hight and Sampson 2002; Pelizzari 2003; McAleer 2017). Indeed, it has also been suggested that archaeologists developed imagery to promote certain viewpoints and perspectives. For instance, Wheeler has been argued to have used visual imagery to create the perception of accurate recording and order, in contrast to his predecessors within South Asia, with the depictions of pottery yards, as well as documenting every part of the archaeological process (Chadha 2002; Guha 2003). However, it must also be noted that this development of 'scientific' visual imagery has been argued to go beyond practical needs. In addition to scales, it has been suggested that the use of human figures as scales within photographs led to workers being relegated from producers of knowledge to passive epistemic markers, which reaffirmed imbalanced power relationships controlled by colonial officials (Chadha 2002).

Despite multiple potential meanings, the professionalisation of archaeological investigations in South Asia, through the founding of the ASI in 1861, led to a move towards portraying 'truthful' and 'accurate' images of archaeological and scientific rigour. Marshall is credited with modernising archaeological methods in colonial South Asia, developing programmes for cataloguing and conserving archaeological discoveries, and undertaking systematic excavations (Guha 2002: 96-97). Marshall made it mandatory that the conservation notes of Archaeological Officers should be accompanied by photographic records "showing the condition of the monument from all points of view before its repair is taken in hand, and they should include full particulars (illustrated as a rule by sketches or scale drawings)... No work is to be put in hand without such particulars" (Marshall 1923: 8).

As mentioned above, excavation photographs also began to utilise scientific markers such as scales to depict objective images (Guha 2002: 98). The use of scales is seen throughout Durham University's Sir John Marshall Photographic Collection for both details of excavation trenches

(Figure 1), as well as artefacts with associated catalogue numbers (Figure 2). The importance of scales for photographs is reaffirmed through a caption for an image Marshall published within an article for *The Illustrated London News*: "Apparently objects of worship: A pair of polished "Ring-Stones" found at Harappa (With a foot-rule indicating their size)" (Marshall 1926a: 398).

The archive also indicates the excavation methodologies engaged with by the ASI under Marshall. Large-scale open area excavations were undertaken to identify urban plans, and this strategy was employed at Harappa and Mohenjo-daro, as well as the uncovering of three successive settlements at Taxila. Photographs of large areas were taken, which were complemented by drawn scale plans.

Whilst Marshall's understanding of stratigraphy has been questioned (Jansen 1993), he was keenly aware of its principles, and did attempt to denote and interpret strata and phasing of sites, through plans, section and elevations (Figure 3). Although this has often been viewed in terms of building layouts, some photographs indicate an appreciation of archaeological horizons and stratigraphy within soil-based sequences.

Dissemination

In comparison to his successors in South Asia, Marshall is often perceived as less engaged with public dissemination. As stated above, Marshall published few personal recollections, and this void was filled by his successors and later generations of archaeologists. However, Marshall was one of many archaeologists at this time to recognize the importance of publication of archaeological discoveries through annual reports (Lahiri 2013: 61), but also engaging the public with these discoveries. Marshall developed some of the first purpose-built archaeological site museums in South Asia, including ones established at Mohenjo daro in 1925 and Harappa in 1927 (Guha 2010: 245). He was also aware of the need of publicity and the media to enable support for continued excavations and investigations.

His reports to the press sit within the context of a growing fashion for early twentieth century archaeologists to write media articles and popular books, as well as contributing to the development of specialist radio programmes broadcast on the fledgling BBC (Maloigne 2023: 338). The 1920s was a period of great discoveries in global prehistory that captured the public's imagination, including Howard Carter revealing the treasures of Tutankhamun in the Valley of the Kings and Sir Leonard Wooley's excavations of the Royal Tombs at Ur. Popular weekly periodicals in the UK published news and discoveries from across the British Empire and *The Illustrated London News* was one of the most significant titles with a wide circulation (Griffiths 2022: 17). It was within this publication in 1924 that Sir John Marshall announced to the world the discovery of the Indus Valley Civilization:

"Not often has it been given to archaeologists, as it was given to Schliemann at Tiryns and Mycenae, or to Stein in the deserts of Turkestan, to light upon the remains of a long-forgotten civilization. It looks, however, at this moment, as if we were on the threshold of such a discovery in the plains of the Indus". (Marshall 1924: 529).

Though there was some consternation that this discovery was first publicized in the British press (Guha 2010: 166), with only a later press release directed to papers within India (Lahiri 2013: 340), Marshall's announcement generated much media and public interest. This is what he had hoped to achieve through publishing within the pages of *The Illustrated London News* (Chakrabarti 1988: 161), stating that in relation to the discoveries of the Indus Valley Civilization:

"So impressed indeed was I, by their novel character that I lost no time in publishing an account of them in The Illustrated London News, my hope being that through the medium of that widely read journal I might succeed in getting some light thrown on their age and character by archaeologists in other countries. This hope, I am glad to say, was at once fulfilled" (Marshall 1926b: 48).

The publication of the discovery was soon followed by correspondence discussing the importance of the evidence presented (Guha 2010: 170; Lahiri 2013: 332, 2017: 184). Such was the media impact of the discovery of the Indus Valley Civilization that Marshall became one of *The Illustrated London News*' "Personalities of the Week: People in the Public Eye" (ILN 1932) when his volumes on Mohenjo-daro were published in 1931.

Revolutionizing this dissemination was the use of imagery to illustrate to the public exotic and unique discoveries. The power of photography beyond scientific recording had been identified by archaeologists such as Howard Carter, who began carefully staging photographs of "moments of discovery" (Riggs 2019: 1), allowing the viewer of the image to feel like they were there during the uncovering of the human past. Such "work-in-progress" images could create publicity and, with this associated opportunities for income generation (Riggs 2019: 56, 98, 103). Indeed, Marshall highlighted how he had felt the pride in which the discoveries of the Indus Valley Civilization had instilled within the citizens of India when criticizing the Government for reducing financial assistance to the ASI (Guha 2010: 165).

Marshall was keenly aware of the importance of the value of photography in supporting these aims, and working shots were taken and published, including for the volumes on Mohenjo-daro and the Indus Valley Civilization (Marshall 1931). However, one of the most visually stunning 'staged images' of excavation and discovery associated with the Indus Valley Civilization found within Durham University's archive is an omission from these publications (Figure 4). The image shows a worker holding up an artefact, with site supervisors on the side of the trench looking towards the object, and other workers looking directly towards the camera, with one individual waving, almost to gain the attention of the photographer. This is 'moment of discovery' of what later became referred to as the 'Priest King', one of the only examples of sculptural art found within the Indus Valley Civilization. The back of this image is rather soberly captioned "Mohenjodaro:- Site B East Building, excavation in progress, showing find of statue" (DUROM.1957.1.781). That this image was not present in the final publication of Mohenjo-daro or articles within *The Illustrated London News* might conform to the use of more 'final' images within Marshall's writings. The presence of detailed artefact photographs, including of this sculpture, may also relate to Marshall's aim, as outlined above, to encourage academic discourse surrounding the material culture uncovered at Mohenjo-daro and Harappa. It also

reflects the situation where no retrospective narratives or personal papers relating to moments of discovery relating to the Indus Valley Civilization in the early twentieth century were ever published by Marshall, or archaeologists who had worked at Mohenjo-daro and Harappa, such as Rakhaldas Banerji, Daya Ram Sahni and Madho Sarup Vats (Lahiri 2017: 175).

Marshall's Classical background

Marshall graduated from King's College, Cambridge in 1900 with a First-Class Degree in the Classical Tripos. Following a Western Classical path, he went to work on excavations conducted by the British School in Athens and was awarded the Craven Studentship in 1901 (Das 1959; Gill 2000; Guha 2010). Marshall focused much of his fieldwork on Taxila during his time as Director-General of the ASI. It has been suggested by others that Marshall's interest in Taxila was shaped by his time in Greece and reminded him "perhaps a little nostalgically of the Athenian Acropolis" (Wheeler 1976: 17). This was confirmed by Marshall, who had identified that he was enthused about anything Greek, and that "in that far-off corner of the Panjab it seemed as if I had lighted of a sudden on a bit of Greece itself" (Marshall 1951: xv). Taxila was at the 'Crossroads of Asia' and straddled strategically important trade routes running east-west through South Asia. This movement of goods, people and ideas led to Taxila becoming a cosmopolitan trading centre.

This cosmopolitanism is expressed through the discovery of representations of Greek deities, as well as the development of Gandharan sculpture—which combined Asian imagery with Hellenistic and Greco-Roman sculptural traditions—within the region (Zwalf 1996: 20). Significantly, Western Classical histories referenced this region, including the exploits of Alexander the Great, and during the second century BCE Taxila had been absorbed into Indo-Greek kingdoms (Errington and Cribb 1992: 4-10). It was not only at Taxila where Marshall can be argued to have viewed the archaeological record of South Asia through the prism he knew best, that of the Classical Mediterranean (Lahiri 2013: 83). This prism is also evident in his framing of the Indus Valley Civilization. He suggested that prior to the discovery of the Indus Valley Civilization, that the earliest communities of India were "much what the Helots were to the Spartans" (Marshall 1931: v). Marshall also identified the Iliad and the Odyssey as comparable to the Vedas as the established starting points of the histories of both Greece and South Asia, but that new discoveries at Mycenae, and at Mohenjo-daro and Harappa had revolutionized these understandings (Marshall 1931: vii). In terms of discovery, Marshall placed that of the Indus Valley Civilization in parallel with the importance of those within the Classical Mediterranean, noting in *The Illustrated London News* article of 1924, that this was a discovery of a "Forgotten Age" of "An Indian 'Tiryns' and 'Mycenae'" (Marshall 1924: 529).

Beyond these comparisons, Marshall steered clear of further allusions within his interpretation of the archaeological record of the Indus Valley Civilization. However, within Durham University's Sir John Marshall Photographic Collection, subtle nods to the Classical background of Marshall can be identified. One image shows two terracotta animal figurines from Mohenjo-daro side-by-side, and the deliberate placement of what were interpreted as depictions as a Tortoise and a Hare (Figure 5), might be a playful referencing the story of 'the Tortoise and the Hare' contained within Aesop's Fables from Ancient Greece.

Archives from the Past for the Future

Durham University's Sir John Marshall Photographic Collection not only affords understandings of archaeological discoveries and colonial practice in the past, as well as Marshall's own theoretical and historical perspectives, the archive also provides invaluable insights into both the condition of monuments when they were first discovered and how they were then preserved and presented to the public. It also makes it possible to identify how these monuments, and their settings, have changed in the century since the ASI worked at these sites under the Directorship of Marshall. For Taxila in Focus, 100 key images from within Durham University's Sir John Marshall Photographic Collection relating to Taxila were identified. The exact locations of these across the archaeological site were then mapped. Dr Abdul Azeem, Director-General, Department of Archaeology and Museums, Government of Pakistan, then produced new photographs taken from similar viewpoints. This allowed for evaluations of how individual sites had changed in the intervening 100 years, reviews of the successes (or otherwise) of earlier conservation programmes, and to inform an analysis of the current condition of monuments (Figure 6). The information will be critical to helping to enhance the future protection, conservation and management of monuments across Taxila. This is necessary as many archaeological sites are threatened by natural disasters and human activity. Despite legal protections, many sites are at risk from encroachment, unchecked development, and the use of archaeological materials for construction. In addition to attritional damage and erosion from salination and monsoon rains, multiple short-term environmental shocks also threaten heritage sites, with Mohenjo-Daro severely affected from catastrophic flash flooding in 2022.

As a consequence, Durham University's Sir John Marshall Photographic Collection represents an invaluable international heritage resource for sites across South Asia. Indeed, it provides some of the only surviving documentation and information for sites and artefacts that have sadly been lost and destroyed, as well as for those currently at risk from damage. As such, it represents a critical archive not only for understanding past societies and the development of archaeology as a discipline, but also for the protection of South Asia's heritage in the present and for the future.

Figures

Fig. 1: View of excavations at Site C of Mohenjo-daro with scale visible against the doorway of the exposed structure (Sir John Marshall Collection given by Dr and Mrs Spalding, DUROM.1957.1.776)

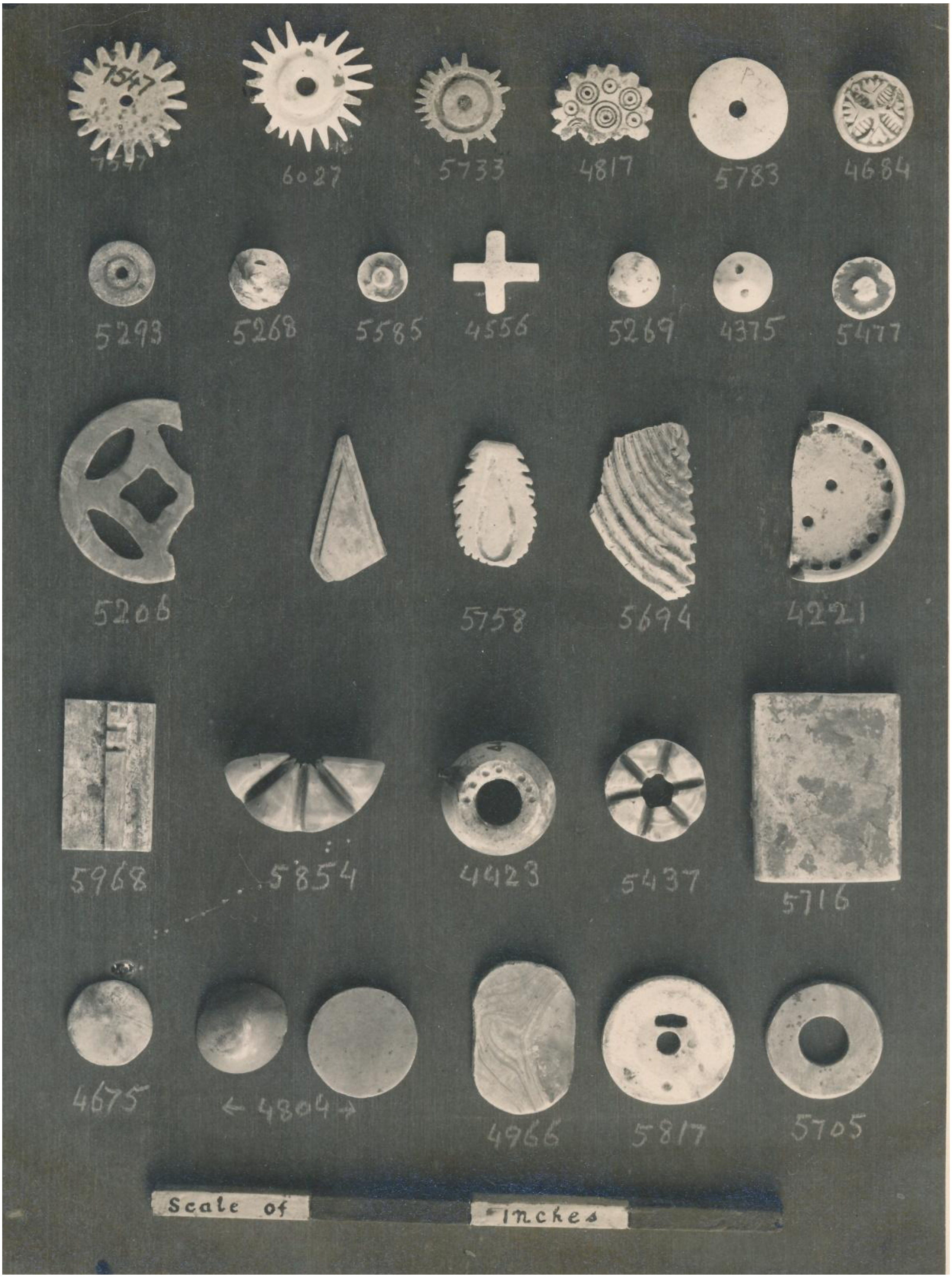

Fig. 2: Artefacts from Harappa, with individual catalogue numbers and scale provided (Sir John Marshall Collection given by Dr and Mrs Spalding, DUROM.1957.1.1214)

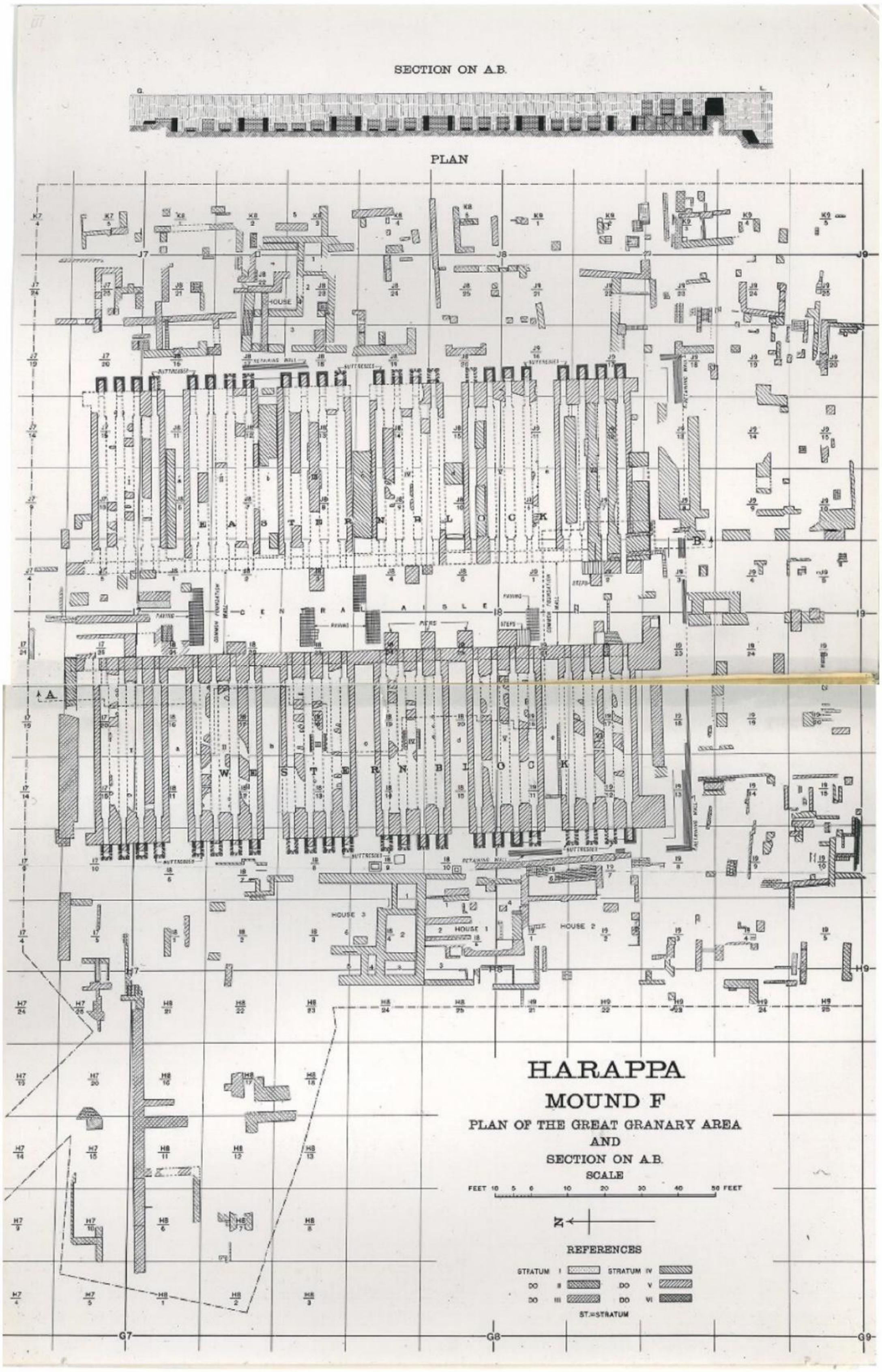

Fig. 3: Plan of Harappa Mound F, including phasing of exposed remains and section across excavated area (Sir John Marshall Collection given by Dr and Mrs Spalding, DUROM.1957.1.1187 and DUROM.1957.1.1188)

Fig. 4: The 'moment of discovery' of the stone sculpture that subsequently became known as the 'Priest King' at Mohenjo-daro (Sir John Marshall Collection given by Dr and Mrs Spalding, DUROM.1957.1.781)

Fig. 5: Terracotta figurines identified as a tortoise and a hare, from Mohenjo-daro (Sir John Marshall Collection given by Dr and Mrs Spalding, DUROM.1957.1.801)

Fig. 6: View of the interior of Lalchak Monastery, Taxila (Above: Sir John Marshall Collection given by Dr and Mrs Spalding, DUROM.1957.1.1683; Below: Image courtesy of Dr. Abdul Azeem)

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Discovery of the Harappan Civilization: Some Questions and Issues that Remain 100 Years Later

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How did Dravidian languages spread over the entire southern peninsula? What is the mechanism that drove it, who operated it and when?

I extend my sincere gratitude to the Tamil Nadu State Department of Archaeology and the Roja Muthiah Research Library for the kind invitation to participate in this landmark event. I intend to reflect upon a few enduring questions that continue to linger, even a century after the discovery of the Harappan Civilization. As a non-academic person, what I share here are merely my thoughts as a close observer. These are not new findings, but rather a set of questions that I hope will provoke reflection on some of the widely accepted or popular assumptions surrounding the Harappan past. It is also important for me to acknowledge, with deep respect, the intellectual debt I owe to the late Padma Shri Iravatham Mahadevan. I had the privilege of meeting him on multiple occasions during the writing of *Early Indians*, and his guidance and insights were not only instrumental to that work but continue to inform much of what I wish to share.

The discovery of the Harappan Civilization was a watershed in many ways. For one, it provided a firm archaeological basis for tracing Indian civilization back to at least the third millennium BCE. For another, it made it possible to understand the different stages of the early evolution of Indian civilization, including the way the different parts of it fit together. Discoveries in population genetics over the last decade have increased the resolution of what we understand; especially the fact that the ancestry of the Harappan population is present today across the subcontinent in a very significant manner.

That, however, leads us to the question of how this came to be. How did the ancestry of the Harappans come to be so strongly shared across the subcontinent? Over what periods did this happen? And to what extent is it linked to both the expansion of agriculture and the spread of languages? This is a subcontinent-wide question that requires attention. However, in what follows, I will be focusing only on southern India. Mr. R. Balakrishnan's works— especially 'The Journey of a Civilization' and 'The Pot Route'— have addressed many issues connected with the migrations from the

Harappan Civilizational area to the rest of the subcontinent. This speech will approach the issue from a couple of different angles. The heart of this talk is about tracing the chronology of the spread of proto-Dravidian in south India alongside the spread of agriculture, and its connection with migrations from the Harappan Civilizational area. Such a chronology of the early development of the Dravidian language family in the south could resolve many problems and also better integrate the evidence we have from archaeology, linguistics and genetics.

There are two parts to this story: first, the migration of pastoralists from the Harappan Civilizational area before the mature phase of the civilization began; and second, the post-Harappan migrations that took place after the civilization declined. So, let us begin with Part 1:

PART 1

The common or public perception has been that a large number of Harappans migrated out of the north-western region of India after their civilization began to decline around 1900 BCE, and that they mixed with populations in other parts of the subcontinent—thus explaining the current spread of genetic ancestry.

However, there is a problem with this explanation. If it were correct, it would have two implications for southern India. First, that this migration after 1900 BCE had little to do with the expansion of agriculture in South India, since agriculture was already well under way in the region by then. Second, that it may also have had nothing to do with the initial spread of the Dravidian language family in the region. This is because the earliest vocabulary of Proto-Dravidian, which is ancestral to all existing Dravidian languages—reconstructed by eminent linguists, Professor Franklin C. Southworth and Dr. David McAlpin, reflects a society engaged primarily in animal husbandry, with some knowledge of agriculture. If it were indeed the urbanites of the Harappan Civilization who brought Proto-Dravidian to the south for the first time after their civilization declined, then the earliest vocabulary of Proto-Dravidian should have a fair number of urban terms, not just pastoral ones.

I will quote from the paper of Professor Southworth and Dr. David McAlpin, published in 1983, with the title 'South Asia: Dravidian Linguistic History':

"The reconstructed vocabulary of Proto-Dravidian reflects a society engaged in animal husbandry, with some knowledge of agriculture. Words for sheep, goat and cattle, all inherited from Proto-Zagrosian (the parent language of Proto-Elamite) along with verbs referring to 'driving' and 'grazing' animals, words for 'herd', 'flock', 'shepherd' and several words which mean both 'house/dwelling' and 'animal/ stall', indicate the importance of herding. No specific (words for) grains are reconstructible, although reconstructed agricultural terms include words for digging and digging tools, operations such as winnowing, churning, reaping, and grinding grain, along with several words meaning 'grain' or 'seed', 'chaff' and 'husk', and possibly a word for the plough. The only reconstructible food plant names are onion/garlic, yam, and eggplant, some of which may be later borrowings into individual Dravidian languages from local sources. Thus, it is unlikely that these people were sedentary farmers at this stage. Several different land types are distinguished, including low lying land, uncultivated land, and field/open space..."

In his paper, 'Proto-Dravidian Agriculture,' Southworth makes a distinction between early Proto-Dravidian and late Proto-Dravidian. He says the following: "Thus, while Early Proto-Dravidian can perhaps be described as partly agricultural-practicing animal husbandry along with gathering and processing of food plants, but with very few identifiable crops—late Proto-Dravidian is clearly agricultural, as it shows a variety of crop plants, many of which are still grown in the area today, along with the necessary technological development for full-time agriculture."

So, as I noted earlier, if indeed, the people who brought Dravidian languages to south India were Harappan urbanists, then the common vocabulary of the proto-Dravidian reconstructed from the existing Dravidian languages should have shown a fair sprinkling of urban words. The fact that it does not suggests that the spread of Dravidian languages happened before the Harappan urbanists reached the region.

Who could have driven this spread of Dravidian language, and when could this have happened?

The answer to this could lie in the sequence and spread of agriculture in southern India, because one of the most common ways for a language to spread is with the expansion of agriculture. When a nomadic or hunting and gathering people settle down to do agriculture, their population starts growing dramatically, leading to migrations that in turn lead to their language spreading to new areas. So the question of who spread Dravidian languages in southern India could come down to who spread agriculture in the region. In south India, the earliest evidence for pastoralism of the kind that early proto-Dravidian reveals comes from northern Karnataka and southwest Andhra Pradesh, from around 2800 BCE, a couple of centuries before the mature period of the Harappan Civilization began.

So how did this pastoralism get going?

In a 2006 paper 'Agricultural Origins and Frontiers in South Asia: A Working Synthesis', the archaeobotanist Dorian Q. Fuller says domesticated animals were introduced to peninsular India from the north. According to him, people in peninsular India–perhaps in the eastern hills between the Krishna and Godavari rivers, going by botanical ecology, had already taken to cultivating two kinds of small millets and two kinds of pulses (like the basic crop package of barley and wheat in north-western India) sometime between 3000 BCE and 2300 BCE. They had domesticated these millets and pulses from locally available wild varieties.

The earliest evidence for the integration of this agricultural package with domesticated animals —mainly cattle but also sheep and goat, comes from 'ashmounds', or large mounds of ash formed by the burning of cow dung, dating from around 2800 BCE. Fuller considers this 'ashmound tradition' to be the outcome of interaction between local cultivators and immigrant pastoralist-foragers. In his own words: "...the Ashmound Tradition seems likely to represent the outcome of a process of cultural interaction and economic development of earlier cultivators, either through interaction with immigrant pastoralist-foragers or the adoption of livestock from

such groups in the north-central Deccan…" The evidence for the introduction of sheep and goat from the north to the south is clear since these have no wild ancestors in the south.

The case for the introduction of zebu cattle is less clear. Even though zebu cattle were first domesticated in north-western India, archaeologists Allchin and Allchin have made a case for their separate domestication in south India, based on rock art depictions. This argument of theirs is not supported by archaeological bone evidence, so the issue remains unresolved. Since the Zebu cattle domestication in north-western India is proven unlike its case in the south, and since the import of sheep and goat from the north is not disputed, the greater probability is that domesticated animals in general were brought to the south from the north.

The question that is interesting for us, then, is who brought domesticated animals from the north, introduced them to south India, and thus completed the full agricultural package and set off an agricultural expansion and perhaps the spread of the Dravidian language family. It couldn't have been Harappan urbanists at a time when the mature Harappan Civilization stage had not yet begun. But it could possibly be other residents of the north-western region who were still pastoralists and who probably spoke a proto-Dravidian language like the Harappan urbanists. Even today, there are pastoralists in the north-western region of the Indian subcontinent, like the B*rahu*is of Balochistan, who also speak a language linked to or classified as Dravidian. There is a possibility, therefore, that some of these pastoralists may have brought cattle and goat herding to south India around 2800 BCE, and that when they did so, they were also the first to bring a Dravidian language to south India – and also probably the earliest to spread the north-western or Harappan ancestry in the south.

Recent genetic studies have shown that the Harappan ancestry is a mixture of ancient Iranian and First Indian ancestry—First Indian, meaning the original Out of Africa migrants who could have reached India before 50 or 60 thousand years ago. It would have been the First Indians who were experimenting with agriculture in the eastern hills between Krishna and Godavari rivers too.

A look at the climatic map of India will show that a pastoral migration of this kind is feasible. There is a savannah zone – an expanse covered in grasses – that runs from Gujarat and Rajasthan through the central Deccan and all the way down to south India, along the western side of the peninsula. This would have been a perfect route for pastoralists to take.

The ashmounds, the earliest monumental features of south India that are found all across the South Deccan plateau, could then be a ringing celebration of the coming together of the full agricultural package and the beginning of an agricultural revolution in southern India. The ashmounds are accumulations of animal dung at ancient penning sites that have been episodically burnt. Anthropologist Peter G. Johansen describes them as sites of "ritual and ceremonial activity within the context of neolithic agro-pastoral landscape production." In his words, "social practices originating in every-day (quotidian) activities were gradually transformed into regular, public ceremonial activities producing monumental forms…"

In the paper 'First Farmers in South India: The role of internal processes and external influences in the emergence and transformation of south India's earliest settled societies," archaeologists Nicole Boivin, Dorian Fuller, Ravi Korisettar and Michael Petraglia say: "A remarkable number

of ashmounds were created during the Neolithic period in south India, and their ubiquity in a range of contexts and phases suggests that they had a central role to play in the Neolithic belief system."

These authors say that ashmounds are not related to a particular phase of the Neolithic, but rather a particular phase of the history of the individual sites. To quote: "That is, many settlement sites actually appear to begin with the creation of an ashmound. The practices that led to ashmound creation are then subsequently abandoned (after perhaps several hundred years or less), though settlement continues, and probably becomes more sedentary." What this strongly suggests to me is a community of people with certain common rituals and practices expanding into new regions and sites as their populations expanded and recreating their community using traditional practices.

So we now have two sets of evidence suggesting how agriculture spread, and what the early language of these agriculturalists could have been. Archaeological evidence, including that of ashmounds, shows how an existing package of seeds came to be combined with domesticated animals around 2800 BCE, how that caused agriculture to take off in southern India. Reconstruction of the vocabulary of the proto-Dravidian language shows that people at this stage were partly agricultural, practising animal husbandry along with gathering and processing of food plants, but with very few crops, and in the process of transition into being clearly agricultural, with a variety of crop plants. In other words, expansion of agriculture and that of Dravidian languages in southern India seem to have gone hand-in-hand, and that began happening before the mature Harappan period began. That takes us now to Part II of the story, the post-Harappan migrations and the mark they have left on Dravidian linguistic history, especially in Tamilakam, which perhaps also explains the stand-out nature of Tamil in the Dravidian language family firmament.

PART II

What we have discussed thus far, however, does not mean that urbanists of the Harappan Civilization did not migrate to south India – or other parts of the country - after the decline of their civilization about a thousand years or more later, that is, after 1900 BCE. But whenever they arrived in south India, with perhaps a more urbanised version of Dravidian language or languages, they would have been building on an existing foundation of Dravidian language presence in south India.

We can perhaps speculate that the references to Agastya of the Vedic texts who moved to the South from the North, or Akattiyan of ancient Tamil literature who led a migration of Velir and other tribes from Dwaraka in Gujarat to the southern peninsula could refer to this later migration of people from the Harappan Civilization.

Because of a Sanskrit myth that portrays Agastya as having been born in a water-pitcher, he is also known as kumbha-yoni, meaning, born from a jar. Scholar Iravatham Mahadevan uses this fact to identify Akattityan or Agastya in a Purananuru poem by Kapilar, Purananuru 201. In the poem, says Mahadevan: "the poet narrates that 'forty-nine generations earlier', an ancestor

of the Velir tribes ruled over Thuvarai, a city surrounded by soaring bronze walls. Kapilar also records that the Velir arose in the tatavu or jar of a 'northern sage'. This extremely important historical reference has remained obscure, as the medieval commentator did not identify the northern sage and misinterpreted tatavu as the sacrificial fire pit".

"I have attempted to set the record straight," says Mahadevan, "by identifying the northern sage in Puram 201 with Agastya, tatavu with his celebrated water-pitcher and Thuvarai with Dwaraka of the Gujarat region."

As Mahadevan points out further, "The story of the southern migration of the Velir from Dwaraka under the leadership of Agastya is narrated by Naccinarkkiniyar in his commentary on Tolkappiyam (payiram; Porul.34)." (Tolkappiyam was written in the centuries around the beginning of the Common Era, and Nachinarkiniyar was a 14th-century commentator – Ed.). According to this legend, the gods congregated on Mount Meru, as a result of which the earth tilted, lowering Meru and raising the southern quarter. The gods thereupon decided that Agastya was the best person to remedy this situation and requested him to proceed to the South. Agastya agreed and, on his way, visited 'Tuvarapati' (Dwaraka) and led the descendants of netu-muti-annal (*Vishnu* or Krishna) including 'eighteen kings, eighteen families of the Velir and the Aruvalar to the south, where they settled down 'clearing the forests and cultivating the land'.

The sage himself finally settled down on the *Potiyil* hill. The fact of Agastya's leadership of the Velir clan rules out the possibility that he was even in origin an Aryan sage. The Ventar-Velir-Velalar groups constituted the ruling and land-owning classes in the Tamil country since the beginning of recorded history and betray no trace whatever of an Indo-Aryan linguistic ancestry."

Mahadevan also uses the myth of Agastya being born from a jar to connect him with the Harappan script, where the image of a jar with handles and a tapering bottom, is by far the most frequent sign, accounting for about 10 percent of the sign occurrences. Mahadevan interprets this symbol to be a masculine singular suffix, anr or anru added to names and titles. In his words, "Since most of the Harappan ruling classes had names or titles ending in -(a)nr, that sound was borrowed by Indo-Aryan as an ethnic name to denote the neighbouring Non-Aryan people. Thus, Dravidian anr becomes Indo-Aryan andr and then Andhra, as attested in Aitareya Brahmana."

What Mahadevan's work does is connect Agastya to the Harappan people, and suggest that the myth of him being born from a jar is an allusion to his connection to the Harappans in general and the jar image of the Harappan script in particular. Mahadevan also suggests that the name Akattiyan or Agastya originates from the Dravidian word 'akatti-yan', related to akattar or akattor, meaning those inside the fort – which would be an appropriate name to give a Harappan leader who lived inside one of the city citadels. He quotes from Kalittokai the word Akattar, meaning princes of the palaces; from Purananuru the word akattor meaning those inside the fort; and from Tolkappiyam the word akatton to mean the king inside the fort. All of this also suggests that Akattiyan is a title or a descriptor, rather than a personal name.

With Agastya figuring in both ancient Tamil legends and ancient Sanskrit legends in different ways, it is, therefore, possible to imagine Akattiyan or Agastya as the name or title of a leading member of pre-Aryan, Harappan polity who or which was known to the Aryan community in the north. In the early centuries after the arrival of the Arya from the Eurasian Steppe, we have evidence from the Rigveda to suggest that there were significant interactions and exchanges between the newcomers and the settled pre-Aryan, possibly Harappan populations. There are Rigvedic verses that thank chieftains of non-Aryan tribes for their help in battles and for their contributions to their sacrifices, and there are even Rigvedic poets who have non-Aryan names.

For instance, in Rigveda VIII.46.32, the composer, Vasa Asvya, thanks the chieftain of a Dasa tribe, Balbutha Taruska, for gifting him a hundred (cattle/horses). Similarly, Rigveda VI.45.31-33 has a heartfelt danastuti (a hymn in praise of a donor) to Brbu who bears a distinctive non-Arya name and who seems to have helped some of the Arya tribes in their fight against their enemies, Panis, who are described as 'niggards' probably because they didn't contribute to sacrifices:

> *"Bṛbu has stood upon the highest head of the niggards [/Paṇis]; (he is) as broad of girth as the Ganges;*
>
> *(He) whose propitious gift in the thousands, at a speed like the wind, is ready for giving all at once."*
>
> *— The Rigveda, translated by Stephanie Jamison and Joel P. Beretton*

But some non-Aryans may have gone beyond being merely allies in battle or donors to Arya sacrifices. There are some instances where non-Arya were accepted into Arya society as composers of hymns. Take, for example, Kavasa Ailusa, composer of five hymns, RV X.30-34, who also sings a danastuti or praise of the donor, Kurusravana, a Kuru prince.

Later texts, such as Aitareya Brahmana and Kausitaki Brahmana fill in the blanks about Kavasa's past. He is described as a 'dasiputra' and an 'abrahmana' (non-brahmana) unfit to share food with and who was ostracized on these grounds by the prominent singers. However, he overcomes the ostracism and finds a prominent place for himself in the Vedic world with a hymn that miraculously brings water to the desert, as scholar Tennilapuram P. Mahadevan points out in his paper, "The Rsi Index and Vedic Anukramani System and Pravara Lists", Kavasa is not a Vedic name, and Prof. Michael Witzel proposes a Dravidian etymology meaning "straddle-legged."

Therefore, one way to reconcile the legends of Agastya in both Sanskrit and Tamil compositions is to see him as a pre-Aryan native Dravidian language speaker, community leader or title-holder who was familiar to the Arya community and who arrived in the South after the Harappan Civilization had declined. That would account for his presence in both northern and southern legends and also his connection to the region of Dwaraka in Gujarat, which is a late-Harappan site. Mahadevan concludes his paper titled "Meluhha and Agastya: The Alpha and Omega of the Indus Script" this way: "*A section of the ruling classes (that is, of the Harappan society) did*

not stay on but migrated under the leadership of the Akattiyar clan to South India, where they founded the Early Historical kingdoms."

The prominence of the Agastya legend in Tamilakam in relation to other regions of the south could then suggest that this region was particularly important in the post-Harappan migrations from the north to the south, just as the early agriculture expansion was centred on northern Karnataka and southwestern Andhra Pradesh. This could possibly be because prime agro-pastoral lands in Tamilakam may have been less populated at this early period relative to similar areas in Upper South India.

As Mahadevan points out in his paper on Meluhha and Agastya: *"While the Tamil Agastya shares the basic myths of his northern counterpart, namely miraculous birth from a pitcher and southern migration from the north across the Vindhya, he is given a very different role by the Tamil tradition. Here Agastya is so totally identified with Tamil that he is termed the Tamil muni ('Tamil sage') and Tamil itself is named after him as Agastyam.... Agastya wrote the first Tamil grammar called Akattiyam (not extant now). Even today, Tamil Nadu has the largest number of Siva temples dedicated to the 'Lord of Agastya' (Agastheswara), a feature almost unique to Tamilnadu, as noted by Ghurye. According to most competent scholars, it is from South India that the Agastya cult was carried to the South-East Asian countries."*

If Akattiyan or Agastya indeed wrote the first grammar of Tamil–whether he is a singular person or one of a line of people who held that title over time, it could be similar in context to what Panini did for the Vedic language. Panini composed his grammar, Astadhyayi, at a time when the spoken language of the cultural elite had deviated considerably from the ancient, orally preserved texts of the Vedas. This is the context that provided the necessity for a grammar that would bridge the old with the new, while standardising the language that was then in use. If the post-Harappan migrants brought with them a version of Dravidian language that had deviated from the language spoken in Tamilakam, that could explain the context and the need for the creation of a grammar for the language spoken in Tamilakam. We, of course, lack sufficient knowledge to say when this could have happened.

That would also probably explain the special nature of Tamil and Tamil linguistic history. It is clear that Tamil stands out from other Dravidian languages in the early nature of its development as a literate and literary language. As Iravatham Mahadevan points out in his paper, 'From Orality to Literacy: The Case of the Tamil Society': "The earliest Tamil inscriptions in the Tamil-Brahmi script may be dated from about the end of the third century or early second century BCE on palaeographic grounds and stratigraphic evidence of inscribed pottery. The earliest inscriptions in Kannada and Telugu occur more than half a millennium later... The earliest extant Tamil literature, the Sangam works, are dated, even according to conservative estimates, from around the commencement of the Christian era. The earliest extant literary works in Kannada and Telugu were composed almost a millennium later."

This is despite the fact that the Brahmi script reached Upper South India (Andhra-Karnataka regions) and the Tamil country at about the same time, during the third century BCE, in the wake of the southern spread of Jainism and Buddhism. The difference was that the script was

used to write in Prakrit in Upper South India, while the script was even modified to write in Tamil in Tamilakam.

As Mahadevan explains: *"The earliest inscriptions in the Tamil country written in the Tamil Brahmi script are almost exclusively in the Tamil language.... In contrast, during the same period, all early inscriptions from Upper South India on stone, copper plates, coins, seals and pottery are exclusively in Prakrit and not in Kannada or Telugu, which were the spoken languages of this region."*

This was not for lack of literary skills, though. King Hala of the Satavahana Dynasty, for example, composed the highly acclaimed anthology, The Gatha Saptasati, in about the first century CE when the Heroic poems of the Sangam period were being composed – except that the Saptasati or Sattasai, was composed in Prakrit, not in Telugu, the spoken language of the people of the region.

Mahadevan attributes this striking difference to the fact that both Karnataka and Andhra were incorporated in the Nanda-Maurya domains, which led to Prakrit becoming the preferred language of governance and that of elite usage. Tamilakam, on the other hand, probably because of its location at the extreme end of the southern Peninsula, remained independent and the Jain monks who reached the land had to find ways to change the Brahmi script to write in the language of the people. But perhaps a part of the reason is also the greater attention that the language received at a very early age, as the legends related to Akattiyan suggest. The groundswell of literary creativity that began with the Sangam or Heroic poetry continued with the epics Cilappatikaram and Manimekalai and later, the Bhakti poetry.

The other Dravidian languages caught up, of course, and by the late first millennium CE or early second millennium, they were on their way to creating new benchmarks for creativity and literary production. After having led the spread of agriculture and the Dravidian language family, Upper South India would once again come to the fore, with Sheldon Pollock describing the Kannada text Kavirajamarga, written around 875 CE, as the first text in South Asia to 'self-consciously theorize the relationship between vernacular and cosmopolitan ways of literary practice' – an indication of another regional language coming into its own after Tamil.

When you keep this history in mind, it is not surprising that the Dravidian language movement started in Tamilakam. But to make the story of the Dravidian language and Dravidian societies truly pan-regional, the early history of the domestication of plants and the spread of agriculture and language, starting with Upper South India, has to be integrated with its history during the period of Heroic poetry or Sangam literature, and with the later history of literary achievements in Kannada, Telugu, Malayalam, and other languages. That is probably a story that is waiting to be written.

There is a model that can be kept in mind while creating this new history of Dravidian languages and people in the south: that of the epic, Cilappatikaram. Cilappatikaram becomes an epic of the entire Tamil country by locating its story in all three parts of Tamilakam that were ruled by the Muventars, or the three crowned kings: Chola, Chera and Pandya. The epic begins in the port city Poompuhar of the Cholas; moves to Madurai, the capital of the Pandyas; and finishes in Chera Nadu, the domain of the Cheras.

The new history of Dravidian languages and societies will have to be written in a similar spirit, taking in all of the domains of Dravidian languages, leaving nothing out. It will start with the agricultural expansion and the spread of languages in Upper South India—that is, Karnataka and Andhra Pradesh—move on to the Heroic poetry and the Bhakti poetry of Tamilakam and the society they portray, and then take in its sweep the later literary and other developments of the rest of the Dravidian languages and societies. It will be less a history of dynasties, and more a history of people, people's movements, and a language family. A project of this kind would be a fitting consequence of this centennial seminar in honour of Sir John Marshall and the discovery of the Harappan Civilization.

That this event in Chennai today is the only major international conference that has been organized to celebrate the discovery of the Harappan Civilization, as far as I know, is significant; it tells us that, whether we like it or not, the responsibility to keep alive the history and spirit of Harappa falls on all of us. That the heritage of Harappa was forgotten for over 3,500 years until John Marshall and his team turned up tells us how easy it is for history to be lost when the political situation changes.

PART III

That brings us to the last part of this talk: how to view the attempts being made today to rewrite school textbooks in order to present the Harappan Civilization as Vedic—and hence to rename it the Saraswati or Sindhu-Saraswati Civilization.

Here is an example of how the Harappan Civilization is being repositioned. This is a direct quote from one of the 16 members of the committee set up to "study the origin and evolution of Indian culture dating back to around 12,000 years ago":

> *"I do believe that the Harappans were Rig Vedic Aryans. The geographical horizon of the Harappan Civilization and the vast area covered by 'Saptha Sindhu' (seven rivers) mentioned by the Rig Veda correspond to each other perfectly. In this land of Saptha Sindhu, the Harappan culture was firmly, deeply settled and Harappa, Ganweriwala, Banawali, Kalibangan, Rakhigarhi, etc. were all situated in that area."*

Now, how do you respond to a statement like this? I will recount the rational and traditional arguments that already exist, before going on to the new argument that needs to be made to ensure that our history does not get distorted again. First of all, we can ask those who insist that Harappa was Vedic to read the genetic papers based on ancient DNA, which clearly show that the migration of Steppe pastoralists—who brought Indo-European languages to India—happened after the decline of the Harappan Civilization. Secondly, we can point out the serious disconnect between the Harappan Civilization and the earliest Sanskrit text we have—the Rigveda. The Harappan Civilization was a leading urban civilization having substantial

trade contacts with other contemporary civilizations. In contrast, the world of the Rigveda is pastoral, with many of its verses focusing on how the gods helped the Arya in their battles with other pastoral tribes and in acquiring cattle wealth. The horse and the chariot are dominant motifs in the Rigveda—but these are strikingly absent in the Harappan Civilization, even as imagery on the thousands of seals it has left behind.

Equally, importantly, the leading centres of the Harappan Civilization are not part of the cultural memory of the Sanskrit-Vedic-Arya culture – there are no epics about Mohenjodaro or Harappa, and no pilgrimage circuits around Dholavira. Going further, the Harappans had a script; the Vedic people did not. The latter had a determined oral tradition until almost the beginning of the Common Era.

But the most effective and truthful argument against the new narrative being created is that it is potentially divisive.

Think about it: What the genetic evidence has shown is that the Harappan Civilization is the heritage of all Indians. When their civilization declined or even earlier, the people of the Harappan cultural region migrated east towards north India and south towards South India, carrying their culture, customs and language, and becoming the ancestors of all Indians. There are no population groups in India today that do not carry Harappan Ancestry. In fact, we know of at least eight population groups that do not carry Steppe ancestry—and all of them are in South India. In that sense, we are all Harappans, inheritors of the legacy of the largest civilization in the world that existed over 4000 years ago, no matter where you live in India.

By contrast, when textbooks are rewritten to falsely suggest that the Harappan Civilization was Sanskritic or Vedic, what you are doing is taking away the Harappan legacy from all Indians in order to assign it to a subsect of the Indian population. That is a divisive enterprise that puts one set of Indians over another, one set of languages over other sets, and one set of cultural practices over other sets of cultural practices.

The story of Indian population formation—told through genetics, philology and archaeology is a thrilling one. It shows us how all Indians today are a mixture of multiple migration streams that occurred over thousands of years. While the disconnect between the earliest Veda—the Rigveda—and the Harappan Civilization is striking, as time goes on, more and more of the Harappan imagery and practices begin to show up in Sanskrit literature. This suggests a process of increasing interaction – borrowings, adoption, adaptation – between the incoming Arya culture and the pre-existing Harappan culture.

For instance, the Harappan Civilization has seals that remind us of yoga positions, but yoga doesn't appear in Sanskrit literature until the *Katha Upanishad*. In other words, what we have built is a unique civilization shaped by many streams of migrations that reached India over millennia.

How profoundly compelling this layered history is—and how impoverished, by comparison, is the imagination that seeks to attribute a shared civilizational heritage, one that rightfully belongs to all Indians, to merely a subset of the population.

I hope this seminar will serve as another important step toward deepening our understanding of the historical continuities and cross-regional linkages that connect North and South, East and West—and, of course, South and South together.

Indus Script and Graffiti Marks: A Comparative Study

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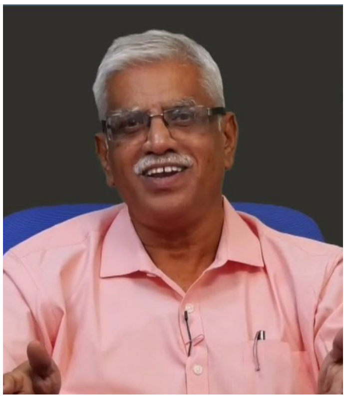
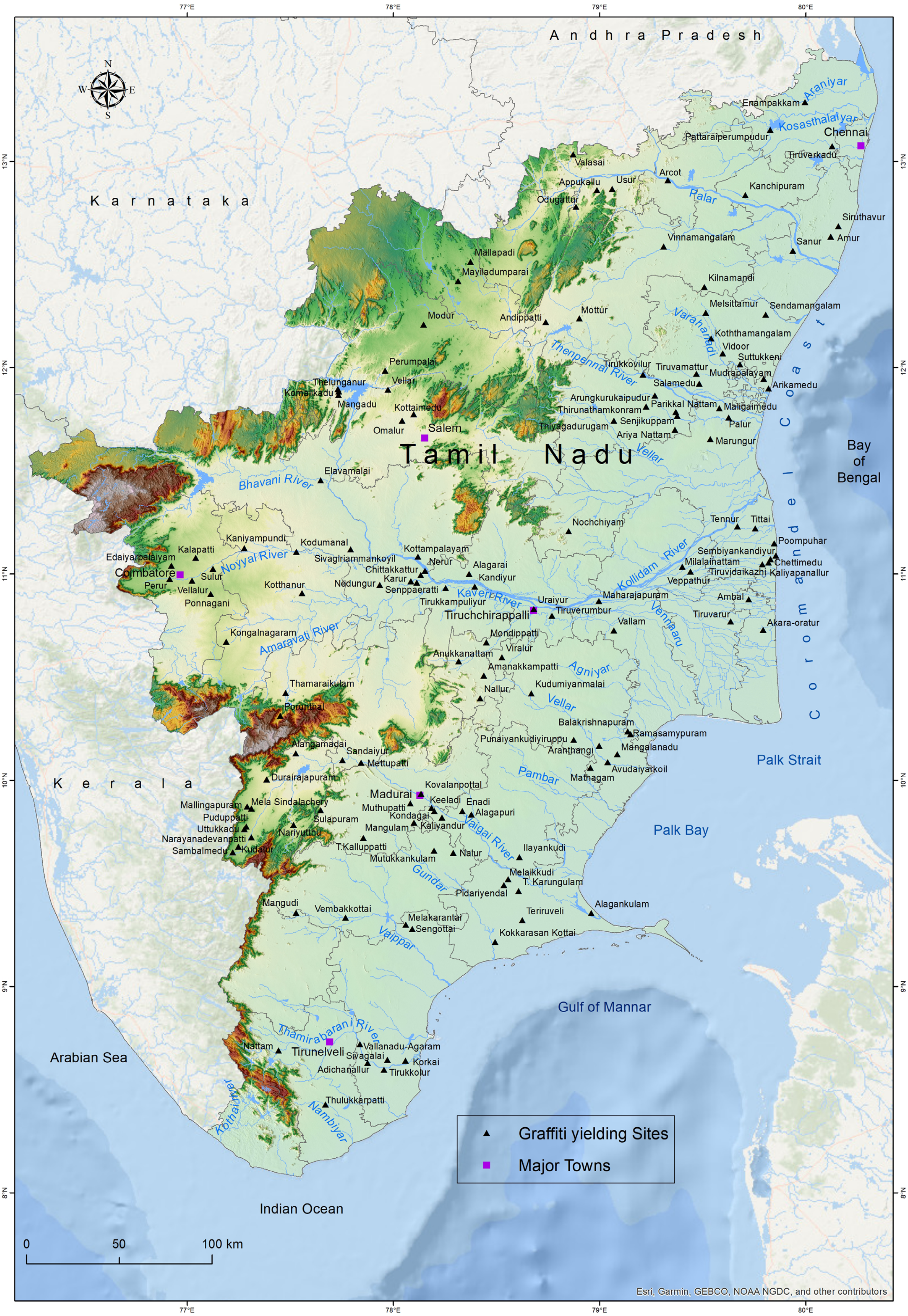


Indus Valley Civilization (IVC), covering around one million square kilometres of the Indian subcontinent, literally occupying more than the combined areas of its contemporary Egyptian and Mesopotamian civilizations, met with nearly 4000 specimens carrying around 450 standardised signs in the seals and sealings representing mostly animals, zoomorphic and anthropomorphic figures. Based on the number of standardised signs, the majority of scholars believe that it represents a logo-syllabic writing system. Irrespective of the best efforts of the scholars, the perfectly engraved and highly standardised Indus script remains undeciphered, irrespective of the identification of the direction of writing, word segmentation analysis, frequency distribution analysis and structural analysis. The search for linguistic links brought to the fore the three basic Dravidian-Aryan-Indigenous hypotheses. Most of the scholars believe that it had more affiliation with Dravidian stock, though the cultural connectivity is yet to be established through material evidence.

The cultural items such as beads of carnelian, agate and lapis lazuli, black-and-red ware, graffiti marks and burying the dead in stone chambers and pits, a non-Vedic feature, reflect the trade or cultural contacts with South India and are repeatedly emphasised as the survival of the cultural links between Indus and South India besides the linguistic connectivity. One more question that is interwoven with the material culture is chronological contemporaneity. It is widely believed that South-Indian Iron Age culture is chronologically later than Harappan culture, and it is post-Harappan in nature. However, the series of recent scientific dates, both AMS and OSL dates, obtained for iron at Adichanallur, Sivagalai, Mayiladumparai, Thelunganur and Mangadu forced us to review this perception.

The AMS 14C and OSL dates pushed the introduction of iron in South India to 2500-3000 BCE, demonstrating that the Iron Age of South India is contemporary to the Copper Age of North-India. Beyond all, one of the material evidences that demonstrates a clear connectivity is graffiti marks. The post-firing graffiti marks are considered one of the survivals of the Indus tradition. The present paper attempts to provide the link or clue that existed



Map 1: Graffiti yielding sites of Tamil Nadu

between the Indus and Graffiti signs based on the documentation of more than 15000 graffiti-bearing potsherds from 140 archaeological sites of Tamil Nadu (Map 1). The exact shapes and their variants found both independently and in composite forms vividly indicate that they were not merely accidental scratches. It is believed that the Indus script or signs would not have disappeared without any traces; rather, they would have transformed or evolved into different forms and survived in some parts of India. As stated above, the cultural items such as beads of carnelian, agate and lapis lazuli, black-and-red ware, graffiti marks and graves reflect the trade or cultural contacts and are repeatedly emphasised as the survival of the cultural links between the Indus and South India, besides the linguistic connectivity. In this background, the graffiti marks of Tamil Nadu were analysed and emphasised their significance.

Black-and-Red ware

In the Indian archaeological studies, ceramics are considered one of the important cultural markers. The existence of various ceramic traditions, both in time and space, such as burnished grey ware, Harappan ware, plain black-and-red ware, white painted black-and-red ware, OCP, PGW, NBPW, Ahar ware, Kayatha ware, Malwa ware, Jorwe ware, russet coated ware, rouletted ware, Arretine ware, amphorae, turquoise glazed ware, torpedo jars, celadon ware and host of other ceramics provided important clue on the cultural movements and trade contacts. Even some of the ceramics were studied in the backdrop of myth, legend, literature, and linguistic affinity. For instance, the Painted Grey Ware is associated with the Mahabharata and the Northern Black Polished ware with Ramayana, Black-and-red ware with Dravidian, russet-coated ware (Andhra ware) with Satavahanas and so on. This kind of association of a particular cultural item with a particular literature or dynasty is presently given up but still ceramics served as one of the important cultural items to study the movement of people. The NBP, rouletted ware, torpedo jar, turquoise glazed pottery, Arretine, amphorae, stamped ware, and many others provided a clue on the trade and cultural contacts between the regions and sometimes across the continent through trans-oceanic interactions.

Among the array of ceramics encountered in India, black-and-red ware occupied a unique place due to its long survival and its wide spread, transcending various cultural phases and geographical zones. The spatial and temporal spread of black-and-red ware throughout the Indian sub-continent kindled a kind of interest among archaeologists and cultural anthropologists. Initially, it was thought that it originated around 2000 BCE during late Harappan times and spread from there to other parts of India. Now, this ware is stratigraphically placed in the pre-Prabhas cultural level and chronologically placed around 3300 BCE in Gujarat. The AMS 14C dates obtained at Sivagalai, Adichanallur, Mayiladumparai, Thelunganur, and Mangadu pushed the date of black-and-red ware before the mid-part of 3rd millennium BCE.

The prevailing opinion on the southward movement of this ware needs to be reviewed in the light of fresh scientific dates. The above-mentioned dates suggest both iron and black-and-ware are contemporaneous. The black-and-red ware received special attention as nearly 70% of the graffiti marks and Tamili (Tamil-Brahmi) inscriptions are found engraved on black-and-red ware. The long survival of this ceramic from 3rd millennium BCE down to 3rd century CE and carrying three scripts, namely graffiti, Tamili (Tamil-Brahmi) and scripts of Tamili-

Vatteluttu transition, further compels us to look into the historicity of the ceramics both in time and space. The habit of engraving on the shoulder portion of the pot is a common phenomenon in Tamil Nadu. The mere quantity of more than 15000 graffiti bearing potsherds and more than 1500 Tamil-Brahmi inscribed potsherds so far documented in Tamil Nadu, covering the period of more than two millennia, demonstrates their continuity and long survival as a kind of writing system of contemporary society.

Indus script and Graffiti Marks

The two terms, namely Indus script and graffiti, are extensively and frequently used in academic deliberations. All recognisable scratches engraved on ceramics in South India and to some extent on Indus ceramics were designated as graffiti. The one engraved on seals and other metal objects of the IVC is designated as a script. Quite interestingly, the signs engraved on the seal were called as script, whereas the signs engraved on ceramics were called as graffiti. Though both of them were written by the same people, they were still differentiated and documented as script and graffiti. However, the extensive comparative study of graffiti marks and Indus scripts made in the present study suggests that both are undeciphered signs. These undeciphered signs should be called either script or graffiti. In the South Indian context, all these signs were reported as graffiti marks and the same designation is being used in the present study too. These graffiti marks received the attention of scholars as early as the latter part of the 19th century and they have been studied for more than a century with several time gaps.

The beginning of documentation of graffiti marks goes back as early as 1881. Beginning with Branfill (1881:1-12), E.H.Hunt, G.Yazdani, B.K.Thapar, B.B.Lal, S.R.Rao, Leshnik, S.Gurumurthy, Seneviratne, K.Rajan and many others continued their research on this subject. Most of the early scholars concentrated on the graffiti marks encountered in Iron Age megalithic graves, whereas B.B.Lal compared the graffiti marks with the Indus script and provided a new direction and dimension to these studies. Following the footsteps of B.B.Lal, S.Gurumurthy compiled the graffiti marks recovered from different cultural zones of India and published a monograph, Deciphering the Indus Script (Gurumurthy 1999). He documented nearly 3056 graffiti signs from 108 archaeological sites. Out of 3056 signs, he assigned 2288 signs as independent signs, 768 signs as ligatures and 72 signs as having resemblance with Brahmi scripts. He identified 513 signs as important signs, out of which nearly 84 signs are similar to the Indus script. Out of 84 signs, 32 belong to the Central Chalcolithic culture, and the remaining 52 signs belong to South India (Gurumurthy 1999:125). He considered that these signs represent pictograph, ideograph and logograph or the combination of all these three systems of writing (Gurumurthy 1999:129). Based on the resemblance, he advocated that the Harappan pictographs reached the South-Indian Iron Age through the Central Chalcolithic culture and they were written from right to left as in the Indus script and the language deployed in these scripts is Tamil. Irrespective of serious methodological issues, Gurumurthy's work on graffiti signs could be considered as the last dedicated attempt at graffiti marks in South India. Notwithstanding its cultural significance, the graffiti marks received sporadic attention in archaeological excavations both in terms of documentation and analysis.

Graffiti Analysis

It is believed that the faithful documentation of these graffiti marks and contextual analysis may help to decipher these undeciphered signs. Further, the decipherment of these graffiti marks may also help

us to decipher the Indus script or vice versa. Faithful documentation is the only answer to these vexing problems, as these graffiti marks serve as one of the trajectories for the benefit of future researchers. To fulfil this goal, a two-year project Documentation and Digitization of Graffiti and Damili (Tamil-Brahmi) Inscribed Postherds of Tamil Nadu was launched by the Tamil Nadu State Department of Archaeology in the year 2022. The intensive documentation resulted in identifying 15184 graffiti-bearing potsherds from 140 sites (Table 1), of which 14165 sherds were documented in all respects. Out of which nearly 2107 signs have been morphologically categorized within a group of 42 base signs, 544 variants and 1521 composites (Chart 1). The basic forms are designated as base signs or any additional strokes added to the base signs are considered as variants of base signs (Table 2). A group of signs containing more than one base sign is accounted as a composite sign. Out of 42 base signs and their variants, nearly 60% of them found their parallels in the Indus script. Quite interestingly, more than 90% of the graffiti marks of South India and the graffiti marks of the Indus Valley Civilization had parallels. Irrespective of the presence of its counterparts in IVC, the present study is more of a morphological approach rather than any linguistics. Future explorations, excavations, scientific investigations and historical linguistic analysis may give a better picture of these thought-provoking cultural and linguistic issues.

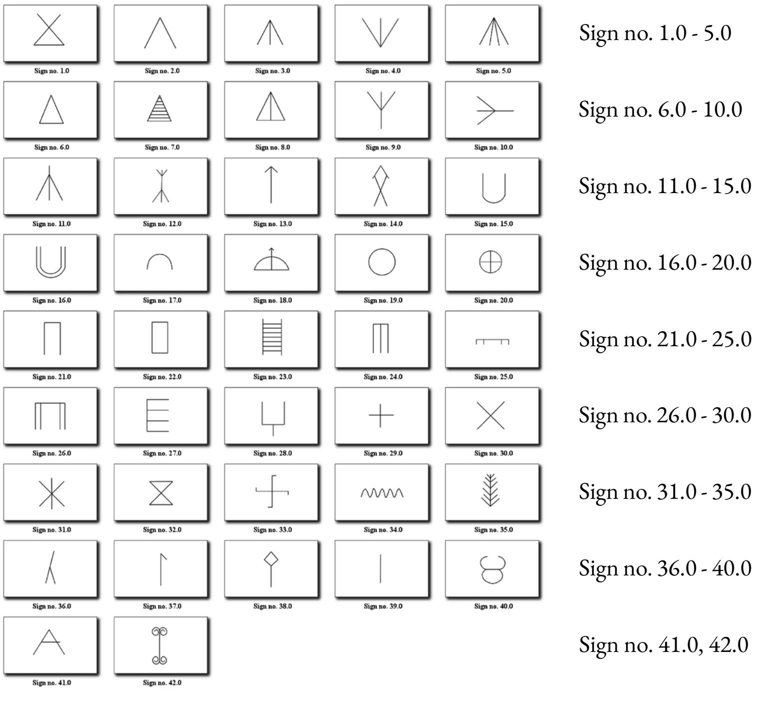


Chart 1: Basic signs

Several signs encountered in Tamil Nadu had exact parallels in the Indus scripts. The signs such as 1.0, 2.0, 3.0, 4.10, 7.10, 9.0, 11.0, 13.0, 14.0, 15.0, 17.0, 18.0, 19.0, 20.0, 21.0, 22.0, 23.0, 25.0, 27.0, 29.0, 30.0, 31.0, 32.0, 33.0, 34.0, 35.0, 36.0, 37.0, 39.0 and 41.0 could be cited as finest examples (the exact parallel Indus signs are 86, 125, 130, 133, 134, 136, 137, 148, 149, 162, 168, 176, 177, 190, 204, 210, 211, 214, 225, 304, 328, and 365)[1]. Likewise, some signs had near parallels. These signs probably evolved from the base signs. Few such parallels were closely examined and convincingly interpreted earlier by scholars like

1 The parallel Indus sign numbers are as per the sign list provided by Iravatham Mahadevan (1977) in the book The Indus Script – Text, Concordance and Tables, Archaeological Survey of India, New Delhi.

S. No	Site	Taluk	District	No. of Sherds	Documented sherds
1	Adichanallur	Srivaikundam	Thoothukudi	932	932
2	Akara-oratur	Nagapattinam	Nagapattinam	3	0
3	Alagankulam	Ramanathapuram	Ramanathapuram	376	376
4	Alagapuri	Sivagangai	Sivagangai	1	0
5	Alagarai	Tottiyam	Tiruchirappalli	58	0
6	Alangamadai	Periyakulam	Theni	1	0
7	Amanakkampatti	Marungapuri	Trichy	1	0
8	Ambal	Nannilam	Nagapattinam	1	1
9	Amur	Thiruporur	Chengalpattu	1	0
10	Andippatti	Chengam	Tiruvannamalai	3	0
11	Anukkanattam	Manapparai	Tiruchirappalli	1	0
12	Appukallu	Anaikkattu	Vellore	4	4
13	Aranthangi	Arantangi	Pudukkottai	1	0
14	Arcot	Arcot	Ranipet	7	0
15	Arikamedu	Pondicherry	Pondicherry	8	0
16	Ariya Nattam	Ulundurpettai	Kallakurichi	15	15
17	Arungkurukaipudur	Tirukkoyilur	Kallakuruchi	1	0
18	Avudaiyarkoil	Avadaiyarkovil	Pudukkottai	1	0
19	Balakrishnapuram	Peravurani	Thanjavur	1	0
20	Chettimedu	Sembanarkoyil	Mayiladuturai	4	4
21	Chittakkattur	Manmangalam	Karur	1	0
22	Durairajapuram	Bodinayakkanur	Theni	1	0
23	Edaiyarpalaiyam	Sulur	Coimbatore	1	0
24	Elavamalai	Erode	Erode	1	0
25	Enadi	Tiruppuvanam	Sivaganga	1	0
26	Enampakkam	Ellapuram	Tiruvallur	1	1
27	Ilayankudi	Ilayankudi	Sivagangai	1	0
28	Kalapatti	Coimbatore North	Coimbatore	1	0
29	Kaliyandur	Tirupuvanam	Sivaganga	1	0
30	Kaliyapanallur	Tarangampadi	Nagapattinam	1	0
31	Kanchipuram	Kanchipuram	Kanchipuram	15	15
32	Kandiyur	Kulithalai	Karur	1	0
33	Kaniyampundi	Avinashi	Tiruppur	1	0

S. No	Site	Taluk	District	No. of Sherds	Documented sherds
34	Karur	Karur	Karur	217	217
35	Keeladi (ASI 797+ TNSDA 1335)	Thiruppuvanam	Sivagangai	2132	2132
36	Kilnamandi	Vandavasi	Tiruvannamalai	103	103
37	Kodumanal (TNSDA 2034+TU-PU598)	Perundurai	Erode	2632	1955
38	Kokkarasan Kottai	Kadaladi	Ramanathapuram	1	0
39	Komalikadu	Mettur	Salem	1	0
40	Kondagai	Vadipatti	Madurai	1	0
41	Kongalnagaram	Udumalpet	Tiruppur	298	298
42	Korkai	Eral	Thoothukudi	422	422
43	Koththamangalam	Vikkiravandi	Villupuram	30	30
44	Kottaimedu	Omalur	Salem	1	0
45	Kottampalayam	Mohanur	Namakkal	1	0
46	Kotthanur	Kundadam	Tiruppur	1	0
47	Kovalanpottal	Madakulam	South Madurai	1	0
48	Kudalur	Uthamapalayam	Theni	1	0
49	Kudumiyanmalai	Iluppur	Pudukkottai	1	0
50	Maharajapuram	Tiruvaiyaru	Thanjavur	1	0
51	Maligaimedu	Panruti	Cuddalore	1	0
52	Mallapadi	Bargur	Krishnagiri	1	1
53	Mallingapuram	Uttamapalyam	Teni	1	0
54	Mangadu	Mettur	Salem	1	0
55	Mangalanadu	Aranthangi	Pudukottai	1	0
56	Mangudi	Sankarankovil	Tenkasi	152	152
57	Mangulam	Melur	Madurai	42	42
58	Marungur	Kattumannarkoil	Cuddalore	1	0
59	Mathagam	Avadaiyarkovil	Pudukkottai	6	6
60	Mayiladumparai	Pochampalli	Krishnagiri	1	1
61	Mela Sindalachery	Uttamapalyam	Teni	1	0
62	Melaikkudi	Paramakudi	Ramanathapuram	1	0
63	Melakarantai	Ettayapuram	Thoothukudi	1	0
64	Melsittamur	Gingee	Villupuram	2	2

S. No	Site	Taluk	District	No. of Sherds	Documented sherds
65	Mettupatti	Vadipatti	Madurai	1	0
66	Milalainattam	Tiruviḍaimarudur	Thanjavur	1	0
67	Modur	Karimangalam	Dharmapuri	5	0
68	Mondippatti	Manapparai	Tiruchirappalli	1	0
69	Mottur	Tirupathur	Vellore	1	0
70	Mudrapalayam	Ozhukarai	Puducherry	1	0
71	Muthupatti	Thirumangalam	Madurai	1	0
72	Mutukkankulam	Kariapatti	Virudhunagar	1	0
73	Nallur	Marungapuri	Tiruchirappalli	1	0
74	Nalur	Tiruchuli	Virudhunagar	1	0
75	Narayanadevanpatti	Uthamapalayam	Theni	1	0
76	Nariyutthu	Aundipatti	Theni	1	0
77	Nattam	Ambasamudram	Tirunelveli	1	0
78	Nedungur	Aravakurichi	Karur	79	79
79	Nerur	Manmangalam	Karur	1	0
80	Nochchiyam	Perambalur	Perambalur	1	0
81	Odugattur	Anaikkattu	Vellore	1	0
82	Omalur	Omalur	Selam	1	0
83	Palur	Panruti	Cuddalore	1	1
84	Parikkal Nattam	Ulundurpettai	Kallakurichchi	40	40
85	Pattaraiperumpudur	Tiruvallur	Tiruvallur	532	532
86	Perumpalai	Pennagaram	Dharmapuri	1028	1028
87	Perur	Perur	Coimbatore	1	0
88	Pidariyendal	Ramanathapuram	Paramakudi	1	0
89	Ponnagani	Kinaththukadavu	Coimbatore	1	0
90	Poompuhar	Sirkazhi	Mayiladuturai	45	45
91	Porunthal	Palani	Dindigul	97	0
92	Puduppatti	Uthamapalayam	Theni	1	0
93	Punaiyankudiyiruppu	Thirumayam	Pudukkottai	1	0
94	Ramasamypuram	Aranthangi	Pudukottai	1	0
95	Salamedu	Villupuram	Villupuram	8	8
96	Sambalmedu	Uthamapalayam	Theni	1	0
97	Sandaiyur	Nilakottai	Dindigul	1	0

S. No	Site	Taluk	District	No. of Sherds	Documented sherds
98	Sanur	Madhurantakam	Chengalpattu	1	0
99	Sembiyankandiyur	Mayiladuturai	Nagapattinam	3	3
100	Sendamangalam	Villupuram	Villupuram	11	11
101	Sengottai	Vilathikulam	Thoothukudi	1	0
102	Senjikuppam	Thirunavalur	Villupuram	1	0
103	Senppaeratti	Karur	Karur	1	0
104	Siruthavur	Thiruporur	Chengalpattu	1	0
105	Sivagalai	Kodumudi	Erode	150	150
106	Sivagiriammankoyil	Kodumudi	Erode	1	0
107	Sulapuram	Peraiyur	Madurai	2	0
108	Sulur	Coimbatore North	Coimbatore	1	1
109	Suttukkeni	Villianur	Puducherry	1	0
110	T. Karungulam	Paramakudi	Ramanathapuram	1	0
111	T.Kalluppatti	Peraiyur	Madurai	1	0
112	Tennur	Sirkazhi	Mayiladuthurai	1	0
113	Teriruveli	Sirkazhi	Mayiladuthurai	227	227
114	Thamaraikulam	Palani	Dindigul	15	15
115	Thelunganur	Mettur	Salem	4	4
116	Thirunathamkonram	Ulundurpettai	Kallakurichi	2	2
117	Thiyagadurugam	Kallakuruchi	Kallakuruchi	1	0
118	Thulukkarpatti	Ulundurpettai	Kallakurichi	4797	4797
119	Tirukkampuliyur	Krishnarayapuram	Karur	9	9
120	Tirukkolur	Eral	Thoothukudi	1	0
121	Tirukkovilur	Tirukkovilur	Tirukkovilur	14	14
122	Tiruvamattur	Vikkiravandi	Villupuram	1	0
123	Tiruvarur	Tiruvarur	Tiruvarur	1	0
124	Tiruverkadu	Tiruvallur	Tiruvallur	1	1
125	Tiruverumbur	Tiruvermbur	Trichy	1	0
126	Tiruvidaikazhi	Nagapattinam	Tarangampadi	1	0
127	Tittai	Sirkazhi	Mayiladuthurai	1	0
128	Uraiyur	Trichirappalli	Trichirapalli	71	0
129	Usur	Usur	Vellore	1	0
130	Uttukkadu	Uthamapalayam	Theni	1	0

S. No	Site	Taluk	District	No. of Sherds	Documented sherds
131	Valasai	Gudiyattam	Vellore	37	37
132	Vallam	Thanjavur	Thanjavur	2	0
133	Vallanadu-Agaram	Srivaikundam	Thoothukudi	449	449
134	Vellalur	Coimbatore South	Coimbatore	2	2
135	Vellar	Omalur	Salem	1	0
136	Vembakkottai	Vembakottai	Virudhunagar	1	0
137	Veppathur	Tiruvidaimaruthur	Thanjavur	1	0
138	Vidoor	Vembakottai	Virudhunagar	1	1
139	Vinnamangalam	Arni	Tiruvannamalai	1	0
140	Viralur	Viralimalai	Pudukkottai	1	0
Total				15184	14165
Note: Several sites were reported with graffiti-bearing sherds both in explorations and excavations. Some of the sherds are not available for documentation. In that case, the number of sherds is given as one sherd. The real number of sherds may still be higher.					

Table 1: Graffiti-yielding sites in Tamil Nadu

S. No	Base sign	Base sign and its variants	Base sign as composites	Total number of variants	Total number of composites	Total
1	1.0	1.1 – 1.39	1.1C-1.124C	39	124	164
2	2.0	2.1 – 2.37	2.1C- 2.179C	37	179	217
3	3.0	3.1 – 3.27	3.1C – 3.105C	27	105	133
4	4.0	4.1-4.3	4.1C-4.19C	3	19	23
5	5.0	5.1-5.16	5.1C-5.35C	16	35	52
6	6.0	6.1-6.9	6.1C-6.40C	9	40	50
7	7.0	7.1-7.4	7.1C-7.32C	4	32	37
8	8.0	8.1-8.5	8.1C-8.7C	5	7	13
9	9.0	9.1-9.6	9.1C-9.42C	6	42	49
10	10.0	10.1-10.4	10.1C-10.5C	4	5	10
11	11.0	11.1-11.12	11.1C-11.59C	12	59	72
12	12.0	12.1-12.3	12.1C-12.3C	3	3	7

S. No	Base sign	Base sign and its variants	Base sign as composites	Total number of variants	Total number of composites	Total
13	13.0	13.1-13.35	13.1C-13.66C	35	66	102
14	14.0	14.1-14.15	14.1C-14.16C	15	16	32
15	15.0	15.1-15.9	15.1C-15.83C	9	83	93
16	16.0	16.1-16.7	16.1C-16.58C	8	58	67
17	17.0	17.1-17.16	17.1C-17.41C	16	41	58
18	18.0	18.1-18.10	18.1C-18.5C	10	5	16
19	19.0	19.1-19.6	19.1C-19.28C	6	28	35
20	20.0	20.1-20.6	0	6	0	7
21	21.0	21.1-21.11	21.1C-21.38C	11	38	50
22	22.0	22.1-22.16	22.1C-22.35C	16	35	52
23	23.0	23.1-23.4	23.1C-23.38C	4	38	43
24	24.0	24.1-2.9	24.1C-24.20C	9	20	30
25	25.0	25.1-25.8	25.1C-25.21C	8	21	30
26	26.0	26.1-26.5	26.1C-26.10C	5	10	16
27	27.0	27.1-27.6	27.1C-27.2C	6	2	9
28	28.0	28.1-28.12	28.1C-28.26C	12	26	39
29	29.0	29.1-29.24	29.1C-29.22C	24	22	47
30	30.0	30.1-30.19	30.1C-30.70C	19	70	90
31	31.0	31.1-31.14	31.1C-31.15C	14	15	30
32	32.0	32.1-32.10	32.1C-32.20C	10	20	31
33	33.0	33.1-33.17	33.1C-33.15C	17	15	33
34	34.0	34.1-34.6	34.1C-34.59C	6	59	66
35	35.0	35.1-35.18	35.1C-35.18C	18	18	37
36	36.0	36.1-36.23	36.1C-36.51C	23	51	75
37	37.0	37.1-37.27	37.1C-37.40C	27	40	68
38	38.0	38.1-38.15	38.1C-38.21C	15	21	37
39	39.0	39.1-39.18	39.1C-39.22C	18	22	41
40	40.0	40.1	40.1C-40.3C	1	3	5
41	41.0	41.1-41.7	41.1C-41.20C	7	20	28
42	42.0	42.1-42.4	42.1C-42.8C	4	8	13
			Total	544	1521	2107

Table 2: Number of occurrences of base signs and sub-signs

Asko Parpola (Parpola 2008:111-131) and Iravatham Mahadevan (Mahadevan 2014:1-44; 2015:1-24). In the academic discussions, the signs made on seals and ceramics were identified as scripts and graffiti marks. The ones found on seals and sealings were reported as script and the matching signs found engraved on ceramics were documented as scripts. Other scratches are considered or reported as graffiti marks. The comparative study of South-Indian graffiti marks with Indus scripts and Indus graffiti marks suggests that there are parallels in both types. So, it is very difficult to consider the signs engraved on seals as scripts and the ones found on ceramics as graffiti. Either we should treat them both as script or graffiti, as both of them were engraved by contemporary society. The two different terms used for identical signs made the analysis a little difficult. The limited data from Tamil Nadu further restricted our analysis to a greater extent. Our research is at an embryonic stage due to limited data at our disposal. Irrespective of these lacunae, we made an earnest attempt to compare the South-Indian graffiti signs with Indus signs on morphological grounds to understand their connectivity.

Out of 42 base signs and their variants, nearly 60% of them found their parallels in the Indus script. Quite interestingly, more than 90% of the graffiti marks of South India and the graffiti marks of the Indus Valley Civilization had parallels. The sign 1.0 is found facing in all directions, but mostly facing up, whereas in IVC seals it is always found facing right in sealings and left in seals (Figs. 1-2). There is an example of facing down both in IVC and South-Indian graffiti. Quite interestingly, the composite form (sign 1.116) is found exact parallels. Sign 2.0, both straight (Figs. 3-4) and inverted (sign 2.1) are found in Indus seals and graffiti. The composite form of having base sign 2.0 with 39.0 is reported at Rakhigarhi. In the same way, a pair of sign 2.0 is reported but restricted to Indus graffiti.

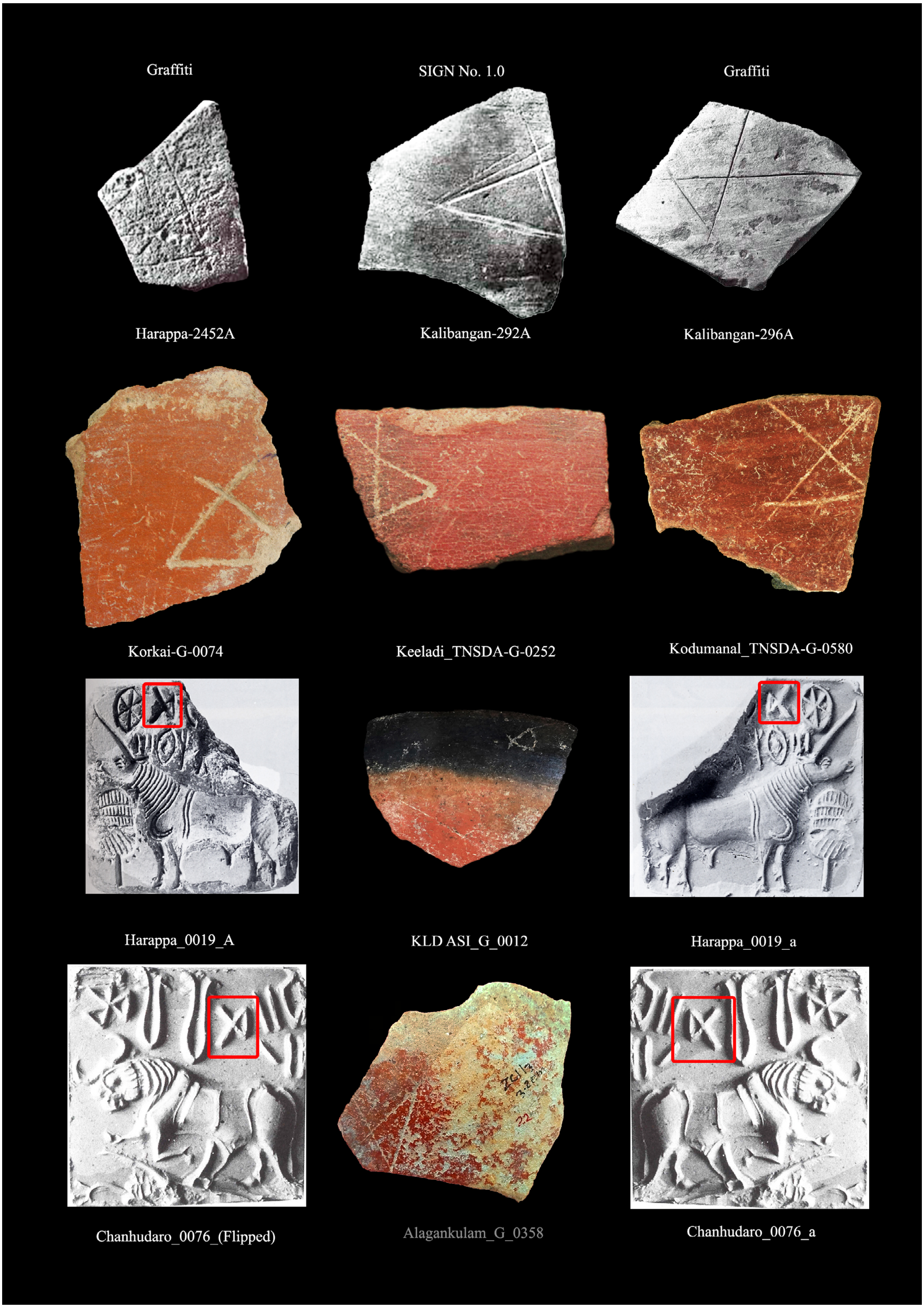
Sign 3.0 is the common one found both in habitation cuttings and graves, as one identified at Kodumunal (Figs. 5-6). The one identified in graves at Kodumanal is considered a clan symbol. This particular sign is absent in Indus seals, but it is noticed in Indus graffiti. The composite form of sign 7.10 had parallels in the Indus script (Fig. 7). In Indus seals, the sign 9.0 is found in association with vertical lines, whereas in Indus graffiti and South-Indian graffiti, they are found independently (Figs. 8-10). The base and composite forms of sign 9.14C, 9.18C and 11.0 had exact parallels in IVC. The upward-facing arrow marks with triangle or flower-shaped heads/tips (sign 13.0) had similarities (Figs. 12-13). In the case of fish signs (sign 14.0), they were found both in stylish and exact forms (Fig. 14). The former one is reported in both places.

The U-shaped sign (sign 15.0) is reported in both places (Fig. 15). The famous Indus jar symbol is reported without arms at the top in several places. Interestingly, this sign is mostly found at the initial stage of the composite forms. The sign (sign 17.7) had exact parallels both in Indus and South-Indian graffiti (Fig. 16). The bow and arrow mark (sign 18.0) is found facing in all directions whereas in Indus seals/sealings it is found facing either right or left depending on the object (Fig. 17) . A plain circle and a circle having a plus mark or spokes on the interior (sign 19.0 and 20.0) had several examples in both places (Figs. 18-19). In the same way, the plain rectangle or rectangle divided into four or more boxes had parallels (sign 21.0, 22.2, 22.4 and 22.23) (Figs. 20-22). The ladder symbol (sign 23.0) is mostly found in the initial stage of the composite form and in Indus script it is found either at the initial or terminal stages, depending upon whether it is a seal or sealing (Figs. 23-24). Likewise, signs 25.6 and 27.4 had several parallels (Figs. 25-26).

The sign 1.25 had two arms or oblique strokes attached to the right oblique line on the exterior top whereas in Indus script, it is noticed on both arms. Similarly, sign 28.1 had a vertical line placed in the middle top of the rectangle, whereas in the Indus, a small rectangle was attached in place of a vertical line (Fig. 27). The square box, both plain or divided into four or many boxes (sign 29.0) is common at both places (Figs. 28-29). The X-shaped sign, the star-like sign and their composites (sign 29.0 and 30.8C) are common (Fig. 30). The hourglass sign (sign 32.0), placed horizontally and vertically, has similar occurrences both in seals and ceramics (Figs. 31-32). The clockwise and anti-clockwise turned swastika-like signs (sign 33.0) are both in the Indus and South India (Fig. 33). The wavy line (sign 34.0) is always found in association with another base sign, resulting in a composite form (Fig. 34). Such is the case with the Indus script also. The flower sign (sign 35.0), inverted Y-like sign (sign 36.0), Z-like sign (sign 37.0), A-like sign (sign 41.0) and star sign (sign 73.0) are some of the other common signs encountered at both places (Figs. 35-37). Thus, the exact shapes and their variants found both independently and in composite forms vividly indicate that they were not merely accidental. It is believed that the Indus script or signs would have not disappeared without any traces rather, they would have transformed or evolved into different forms. The present study is more of a morphological approach rather than any linguistics.

Concordance

The complete sign index is prepared to understand the combination and frequency of base signs, variants of base signs and composite signs. The frequency statistics and positional distribution of each base sign can be ascertained from the concordance. The majority of specimens are engraved with a combination of two or three base signs serving as composite signs. The individual base signs that are found in composite forms are identified based on comparative analysis. Such occurrences are sorted out and listed. A concordance is prepared to see the position/placement of a particular sign in comparison with other base signs. In composites, each base sign is taken as a stem (main sign in the group of signs) and other signs occupying the preceding or initial position of the stem are assigned as prefix-1, prefix-2 and so on, and other signs occupying the succeeding or terminal position are termed as suffix-1, suffix-2 and so on. The individual base signs and their variants are not taken into account for the preparation of the concordance. The concordance is prepared for all the composites of 42 base signs. There are several instances in which two or more base signs are superimposed or overwritten as ligatures. In that case, it is very difficult to determine which sign is the stem and which one is an initial or terminal sign. The sign combinations and frequency are taken into account to determine the positional aspects of base signs. There are several base signs found in composite and ligature forms. All the base signs are repeated and reported in their respective sign list as stems. Accordingly, the concordance is tabulated to understand the position of a particular sign in a given composite form. For instance, the sign no. 2.0, 3.0, 16.0, etc., mostly occupy an initial position. The sign 34.0 (wavy line) hardly occurs independently rather it is found in association with another base sign mostly superimposed. Several base signs occur in pairs (sign 1.0, 2.0, 3.0, 4.0, 7.0, 9.0, 11,0, 16.0,19.0, 23.0, 30.0 and 33.0), rarely repeat as triple instances (3.0, 23.0 and 40.0) and very rarely quadruple takes place (sign 19.0). The single/double vertical lines (sign 39.0/45.1), probably indicating a number, are mostly found in association with sign 1.0, 3.0, 9.0, 15.0, 16.0, 30.0 and 34.0. The sign 26.0 (circle) is also having the same disposition. Interestingly, the stylish fish sign (sign 14.0) is found in association with other base signs. Whereas,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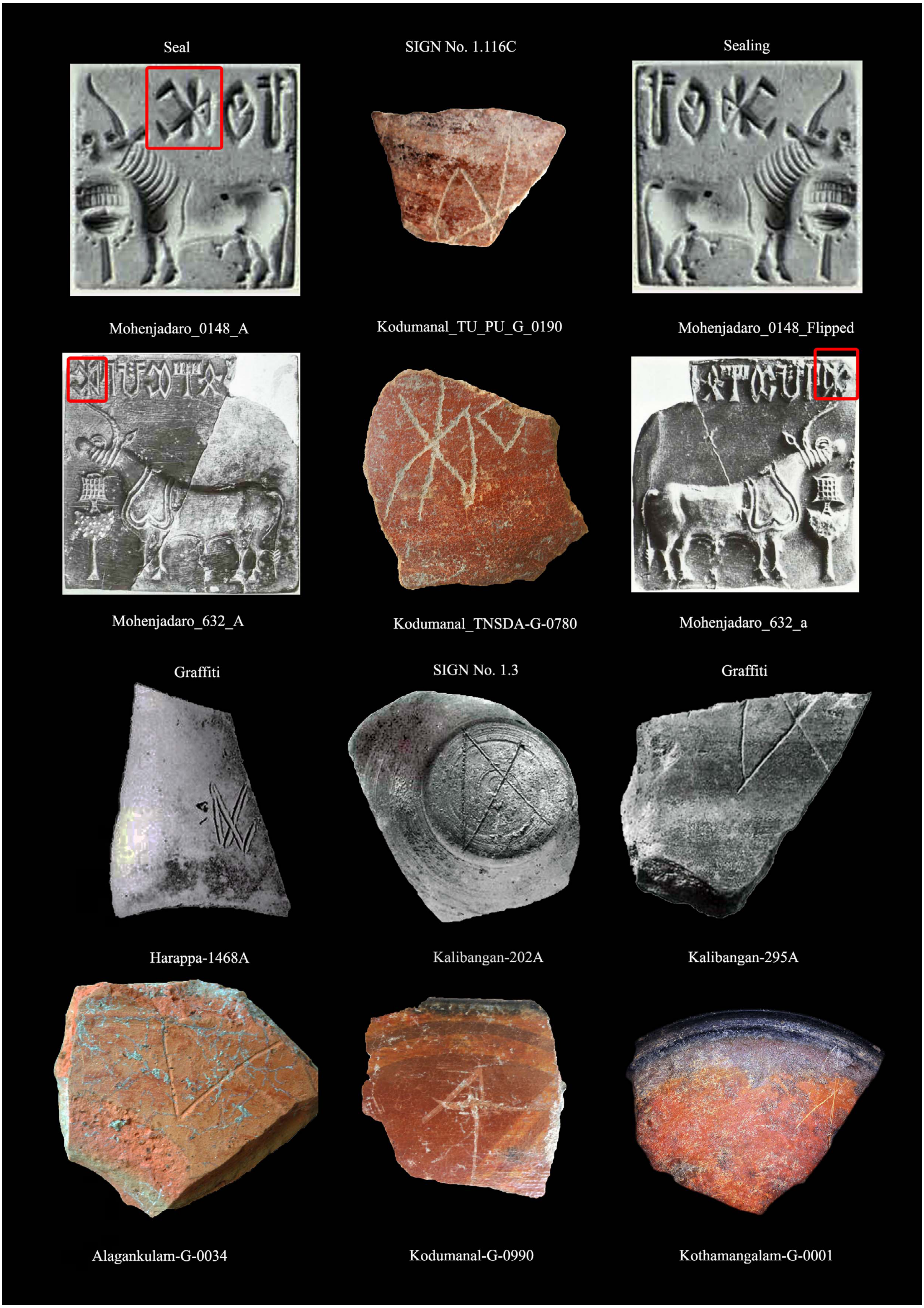
Kalibangan-296A
Korkai-G-0074
Keeladi_TNSDA-G-0252
Kodumanal_TNSDA-G-0580
Harappa_0019_A
KLD ASI_G_0012
Harappa_0019_a
Chanhudaro_0076_(Flipped)
Alagankulam_G_0358
Chanhudaro_0076_a

Fig. 1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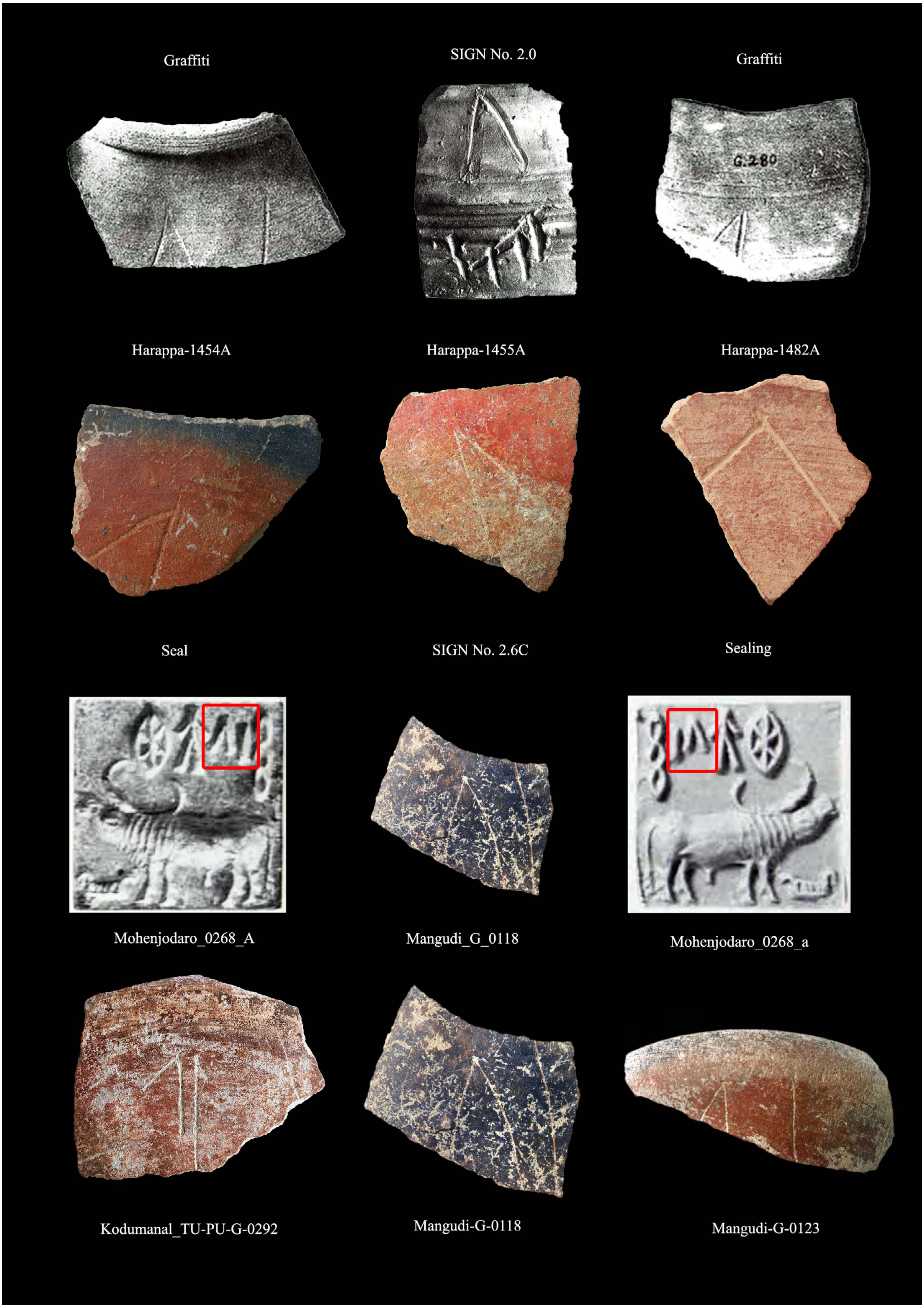
Kodumanal_TU_PU_G_0190
Mohenjadaro_0148_Flipped
Mohenjadaro_632_A
Kodumanal_TNSDA-G-0780
Mohenjadaro_632_a
Graffiti
SIGN No. 1.3
Graffiti
Harappa-1468A
Kalibangan-202A
Kalibangan-295A
Alagankulam-G-0034
Kodumanal-G-0990
Kothamangalam-G-0001

Fig. 2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Graffiti
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Harappa-1455A
Harappa-1482A
Seal
SIGN No. 2.6C
Sealing
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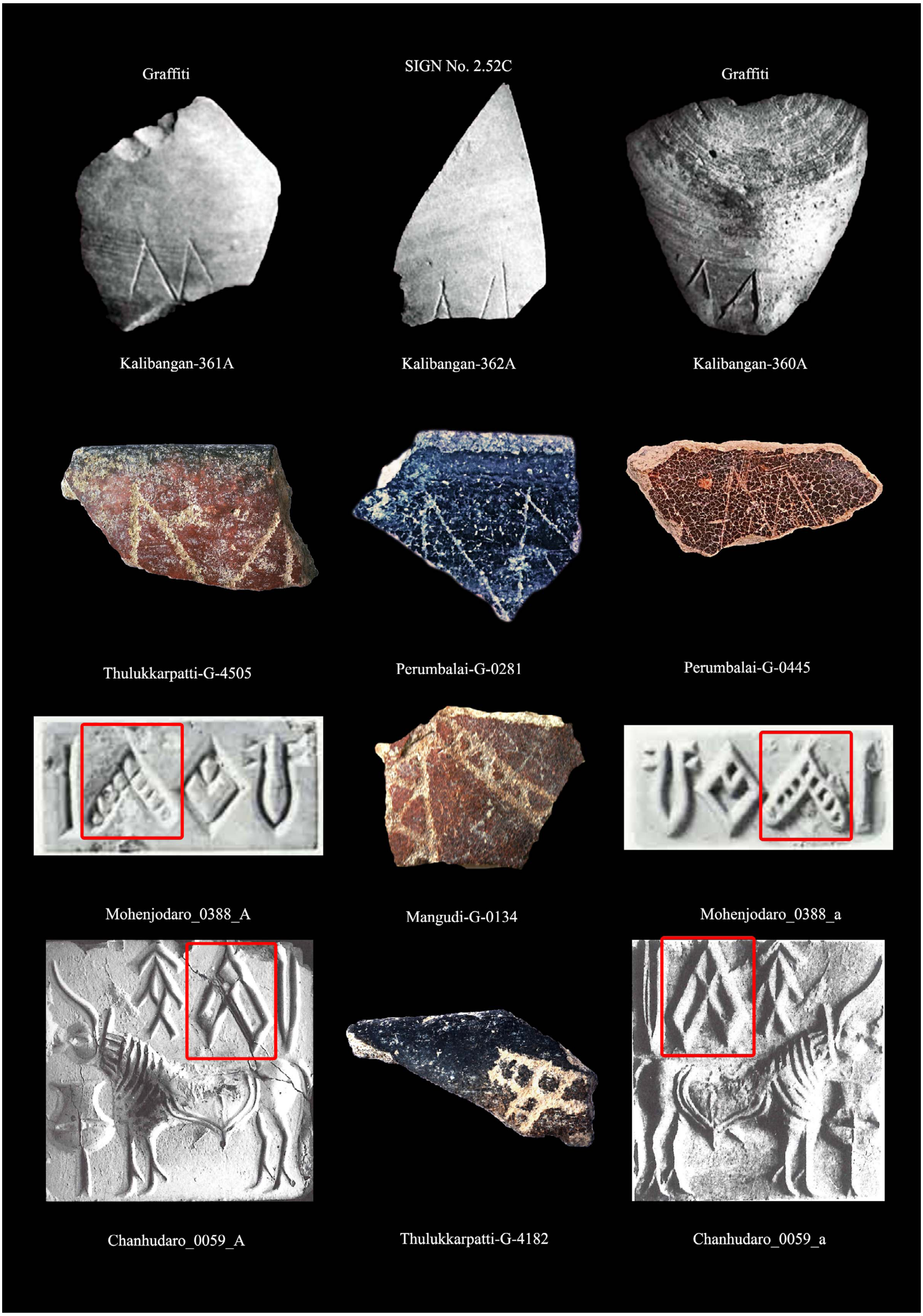
Mangudi_G_0118
Mohenjodaro_0268_a
Kodumanal_TU-PU-G-0292
Mangudi-G-0118
Mangudi-G-0123

Fig. 3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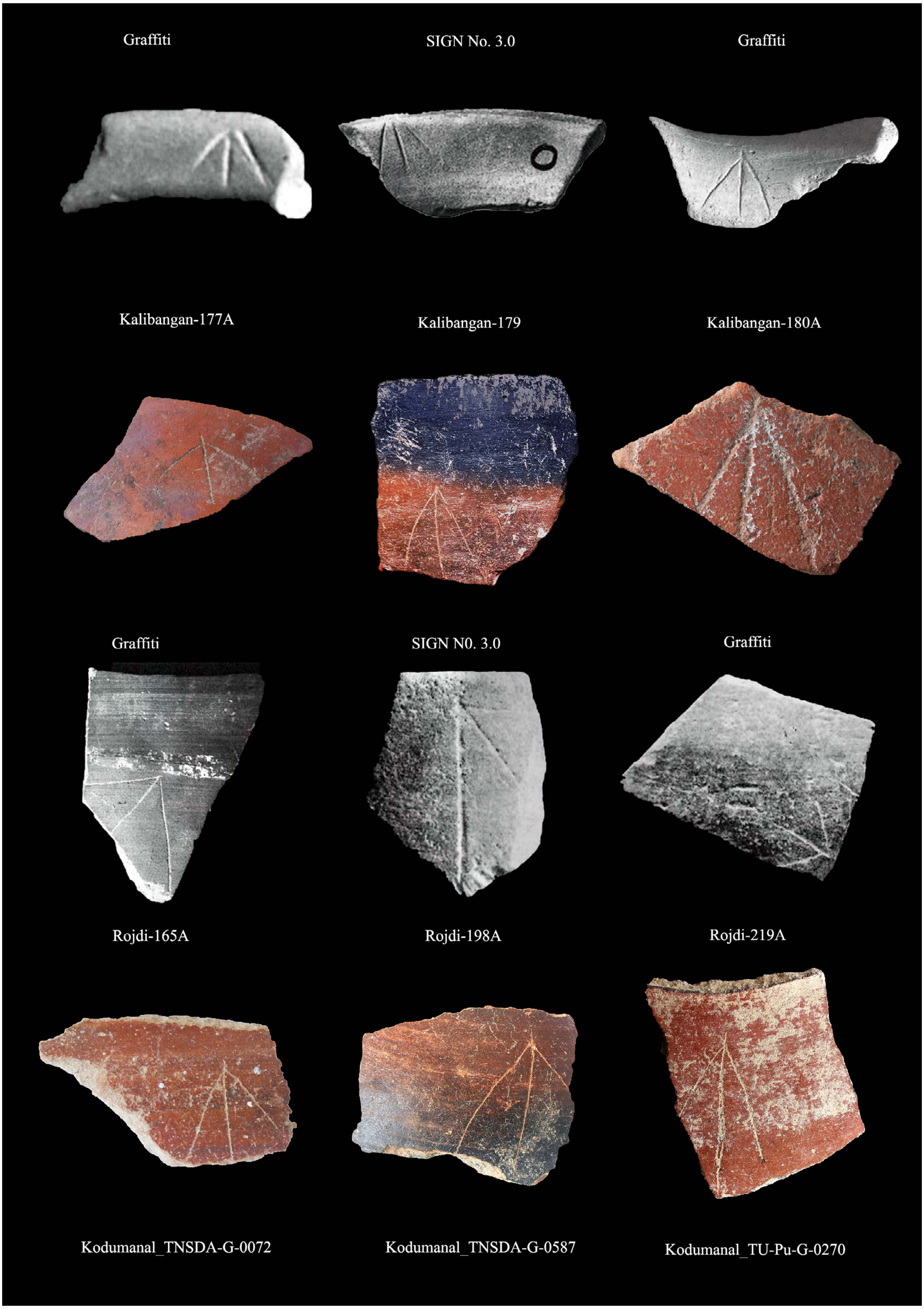
Kalibangan-362A
Kalibangan-360A
Thulukkarpatti-G-4505
Perumbalai-G-0281
Perumbalai-G-0445
Mohenjodaro_0388_A
Mangudi-G-0134
Mohenjodaro_0388_a
Chanhudaro_0059_A
Thulukkarpatti-G-4182
Chanhudaro_0059_a

Fig. 4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Graffiti
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Kalibangan-179
Kalibangan-180A
Graffiti
SIGN N0. 3.0
Graffiti
Rojdi-165A
Rojdi-198A
Rojdi-219A
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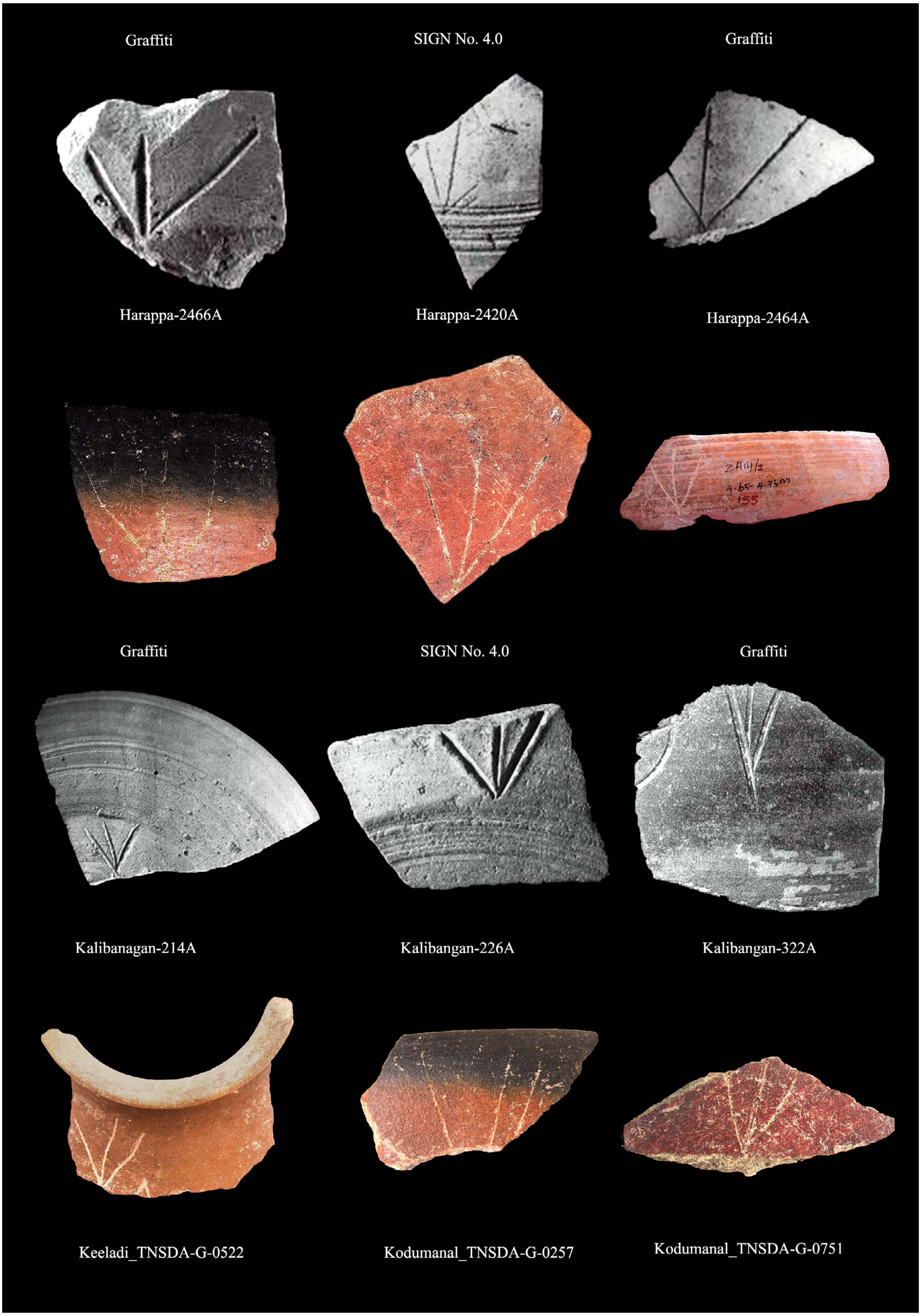
Kodumanal_TNSDA-G-0587
Kodumanal_TU-Pu-G-0270

Fig. 5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Graffiti
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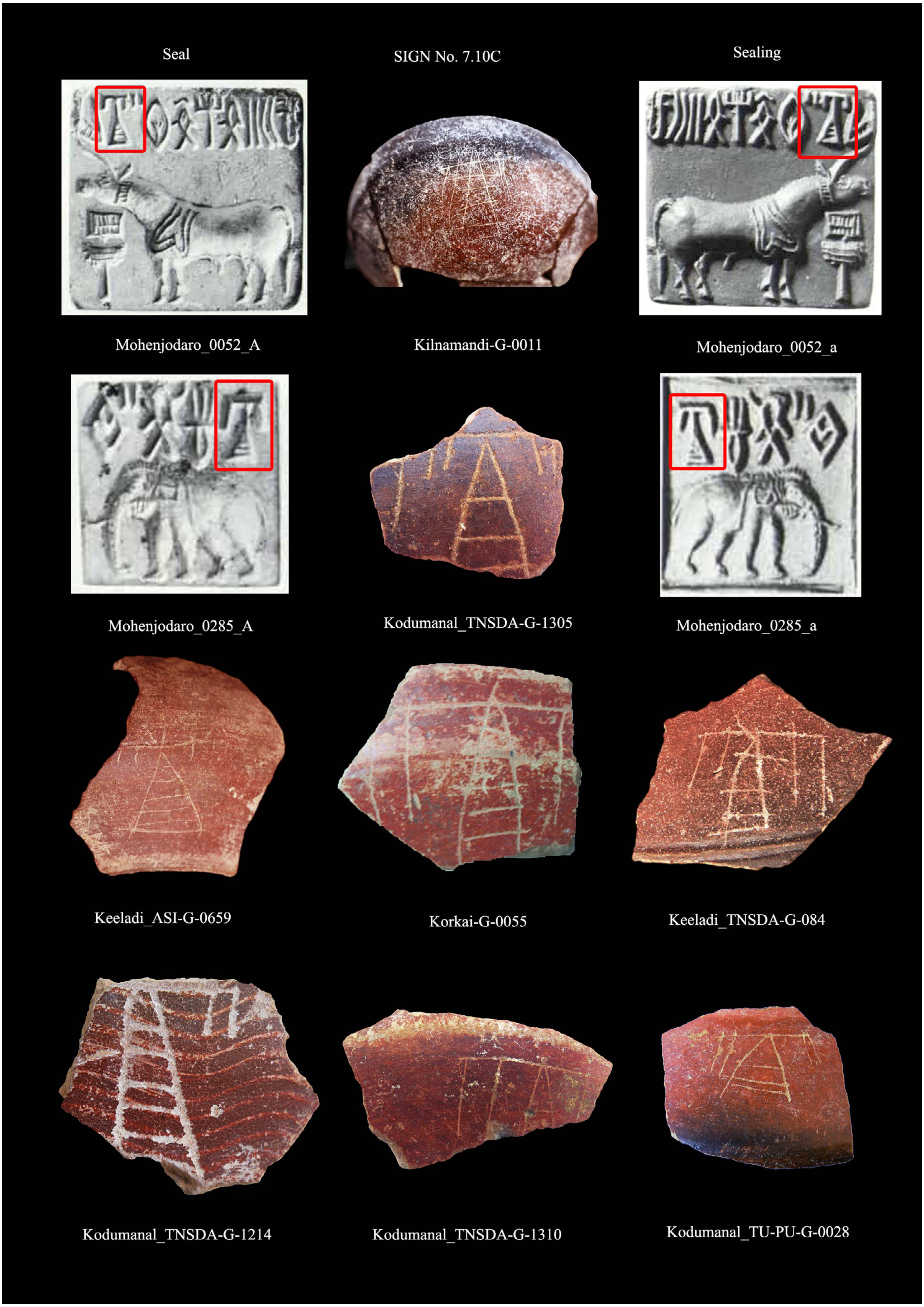
Harappa-2420A
Harappa-2464A
Graffiti
SIGN No. 4.0
Graffiti
Kalibanagan-214A
Kalibangan-226A
Kalibangan-322A
Keeladi_TNSDA-G-0522
Kodumanal_TNSDA-G-0257
Kodumanal_TNSDA-G-0751

Fig. 6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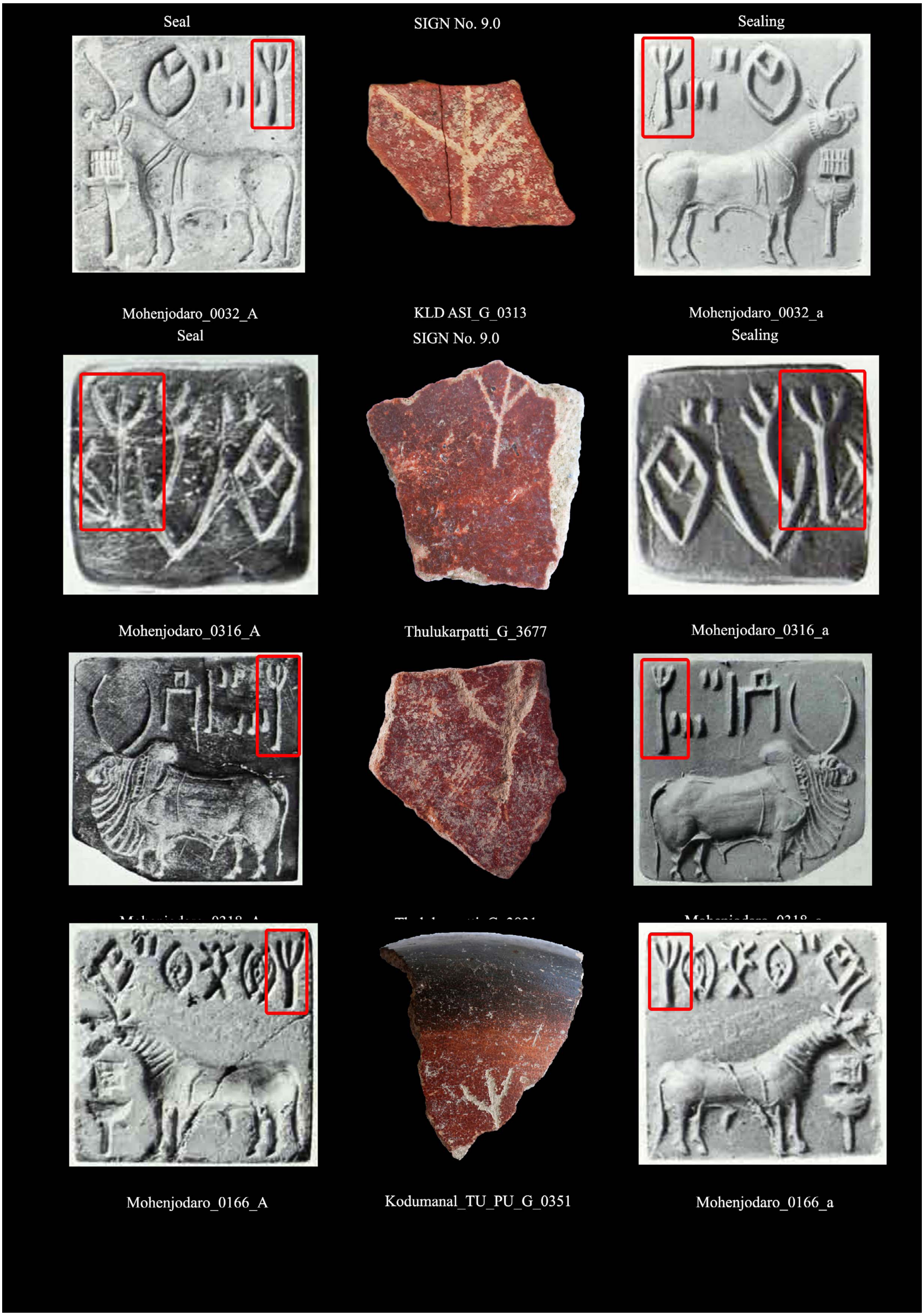
Mohenjodaro_0052_a
Mohenjodaro_0285_A
Kodumanal_TNSDA-G-1305
Mohenjodaro_0285_a
Keeladi_ASI-G-0659
Korkai-G-0055
Keeladi_TNSDA-G-084
Kodumanal_TNSDA-G-1214
Kodumanal_TNSDA-G-1310
Kodumanal_TU-PU-G-0028

Fig. 7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Mohenjodaro_0032_a
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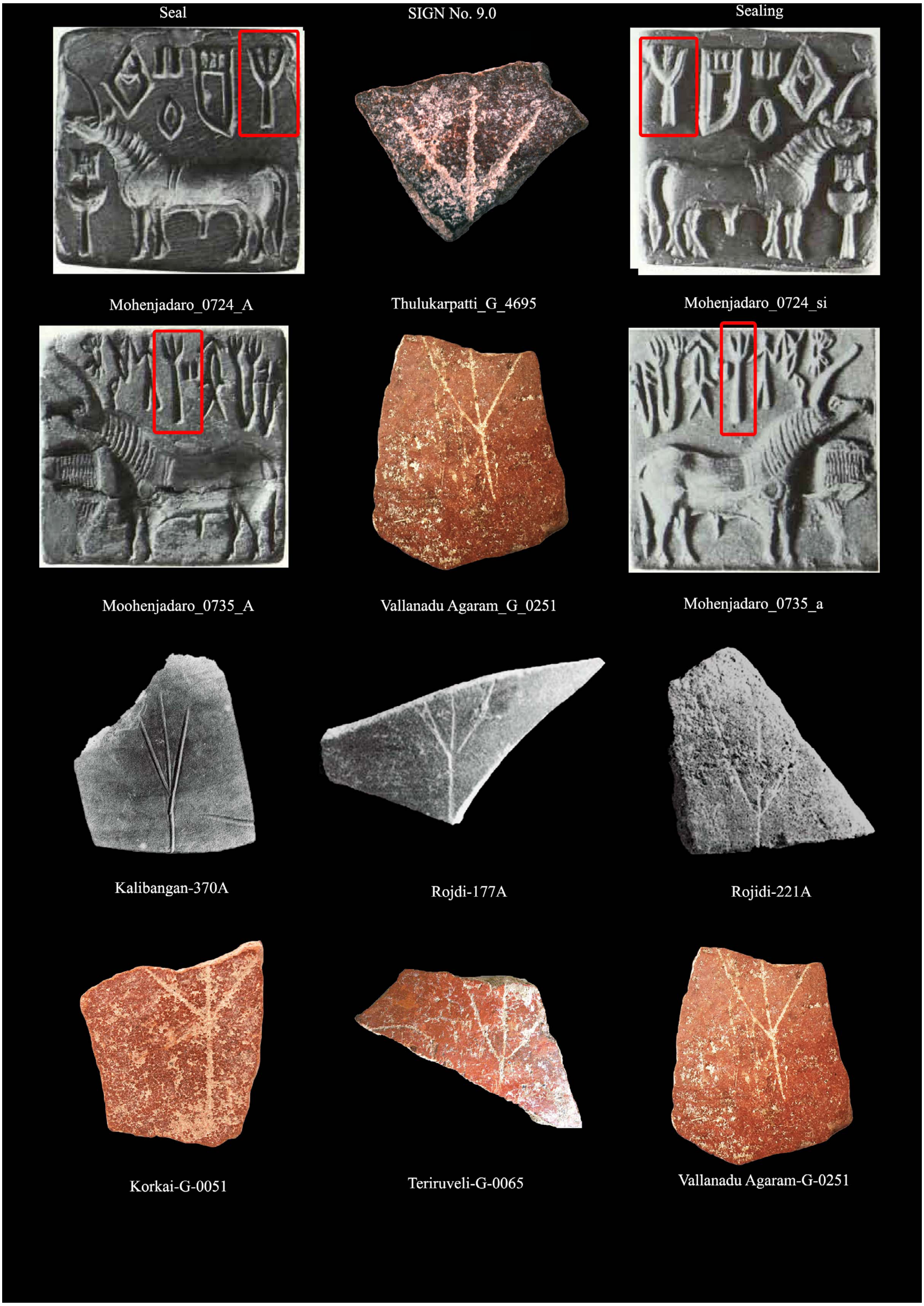
SIGN No. 9.0
Sealing
Mohenjodaro_0316_A
Thulukarpatti_G_3677
Mohenjodaro_0316_a
Mohenjodaro_0166_A
Kodumanal_TU_PU_G_0351
Mohenjodaro_0166_a

Fig. 8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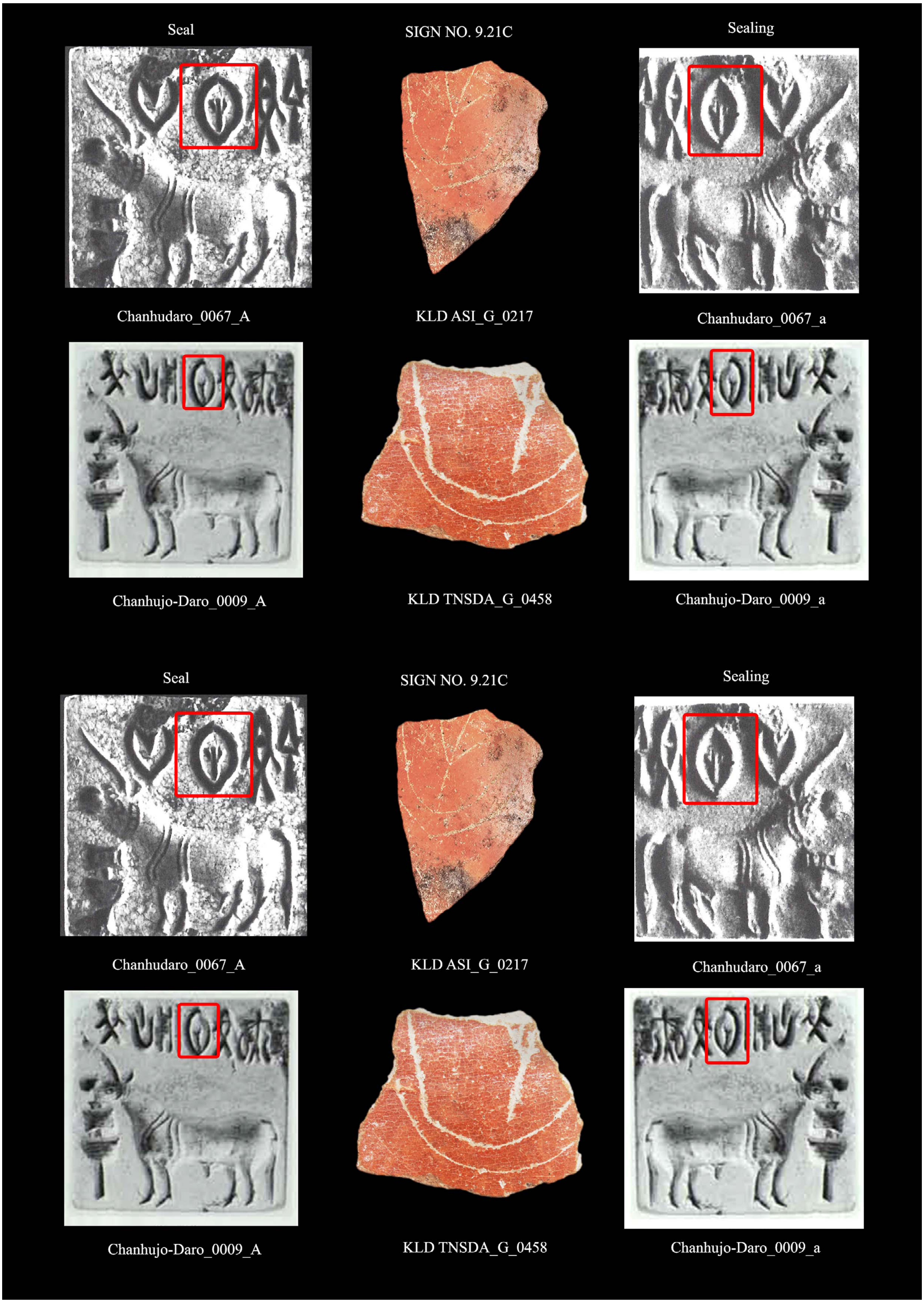
Mohenjadaro_0724_si
Moohenjadaro_0735_A
Vallanadu Agaram_G_0251
Mohenjadaro_0735_a
Kalibangan-370A
Rojdi-177A
Rojidi-221A
Korkai-G-0051
Teriruveli-G-0065
Vallanadu Agaram-G-0251

Fig. 9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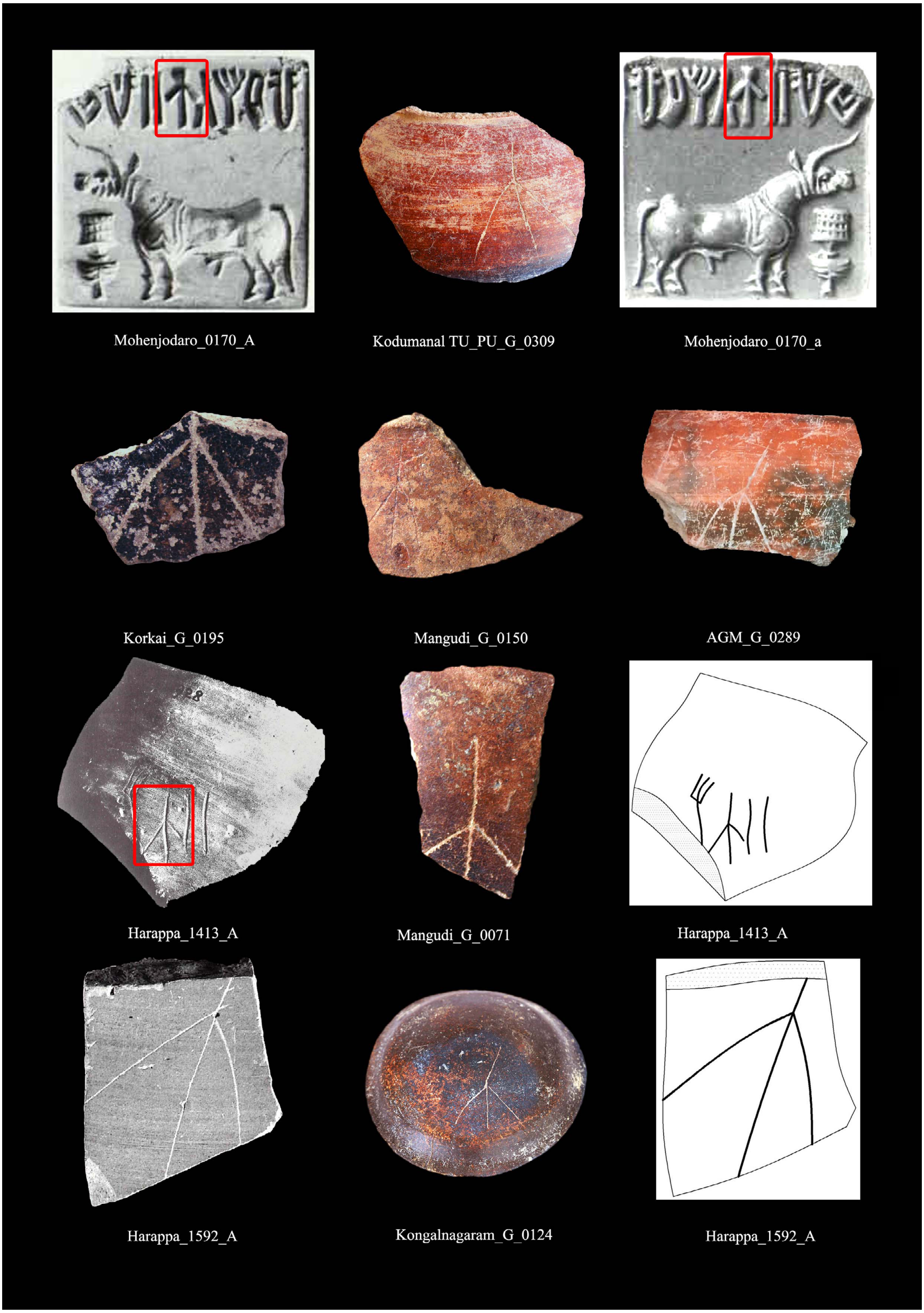
Chanhudaro_0067_a
Chanhujo-Daro_0009_A
KLD TNSDA_G_0458
Chanhujo-Daro_0009_a
Seal
SIGN NO. 9.21C
Sealing
Chanhudaro_0067_A
KLD ASI_G_0217
Chanhudaro_0067_a
Chanhujo-Daro_0009_A
KLD TNSDA_G_0458
Chanhujo-Daro_0009_a

Fig. 10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Kodumanal TU_PU_G_0309
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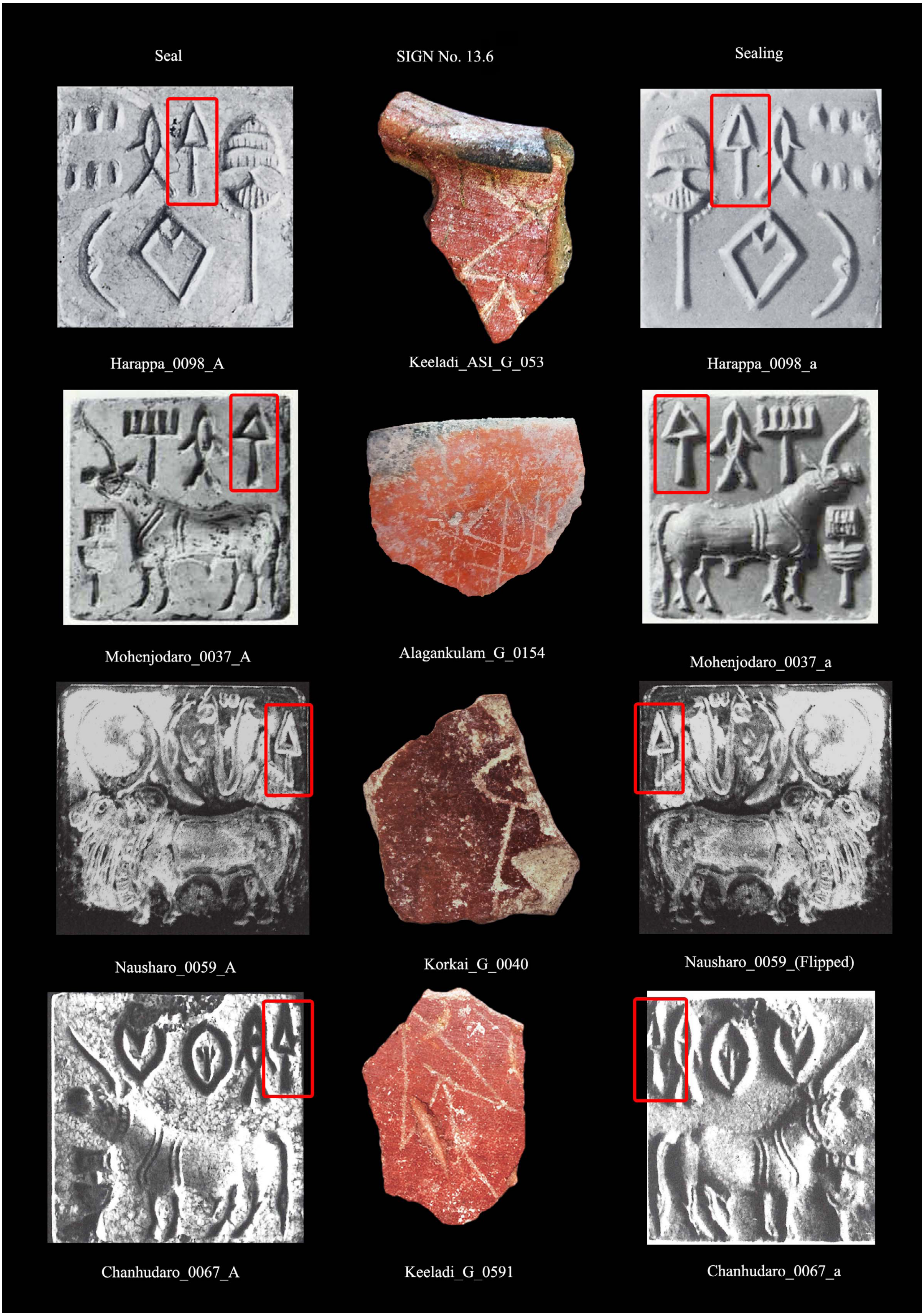
AGM_G_0289
Harappa_1413_A
Mangudi_G_0071
Harappa_1413_A
Harappa_1592_A
Kongalnagaram_G_0124
Harappa_1592_A

Fig. 11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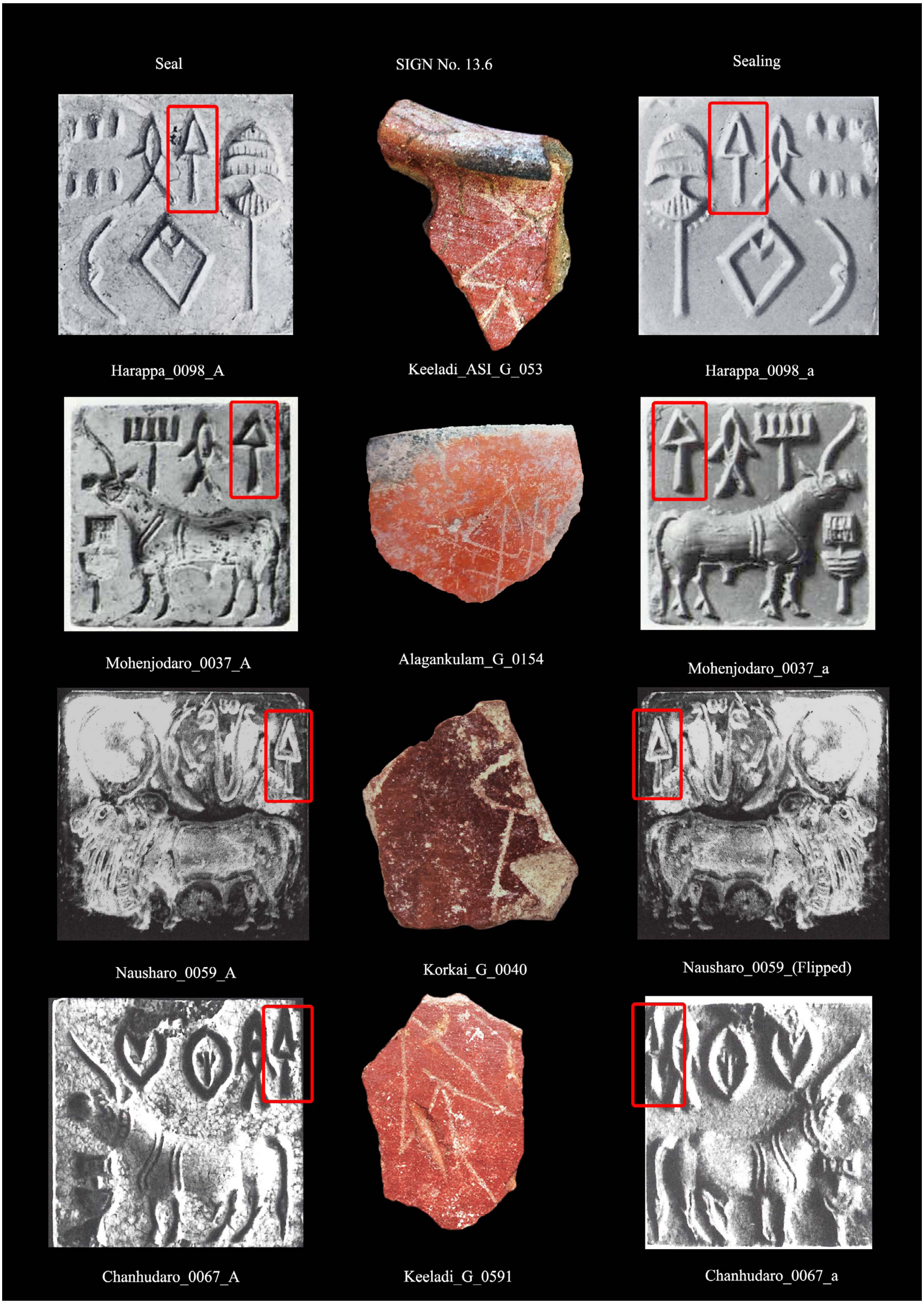
Mohenjodaro_0037_A
Alagankulam_G_0154
Mohenjodaro_0037_a
Nausharo_0059_A
Korkai_G_0040
Nausharo_0059_(Flipped)
Chanhudaro_0067_A
Keeladi_G_0591
Chanhudaro_0067_a

Fig. 12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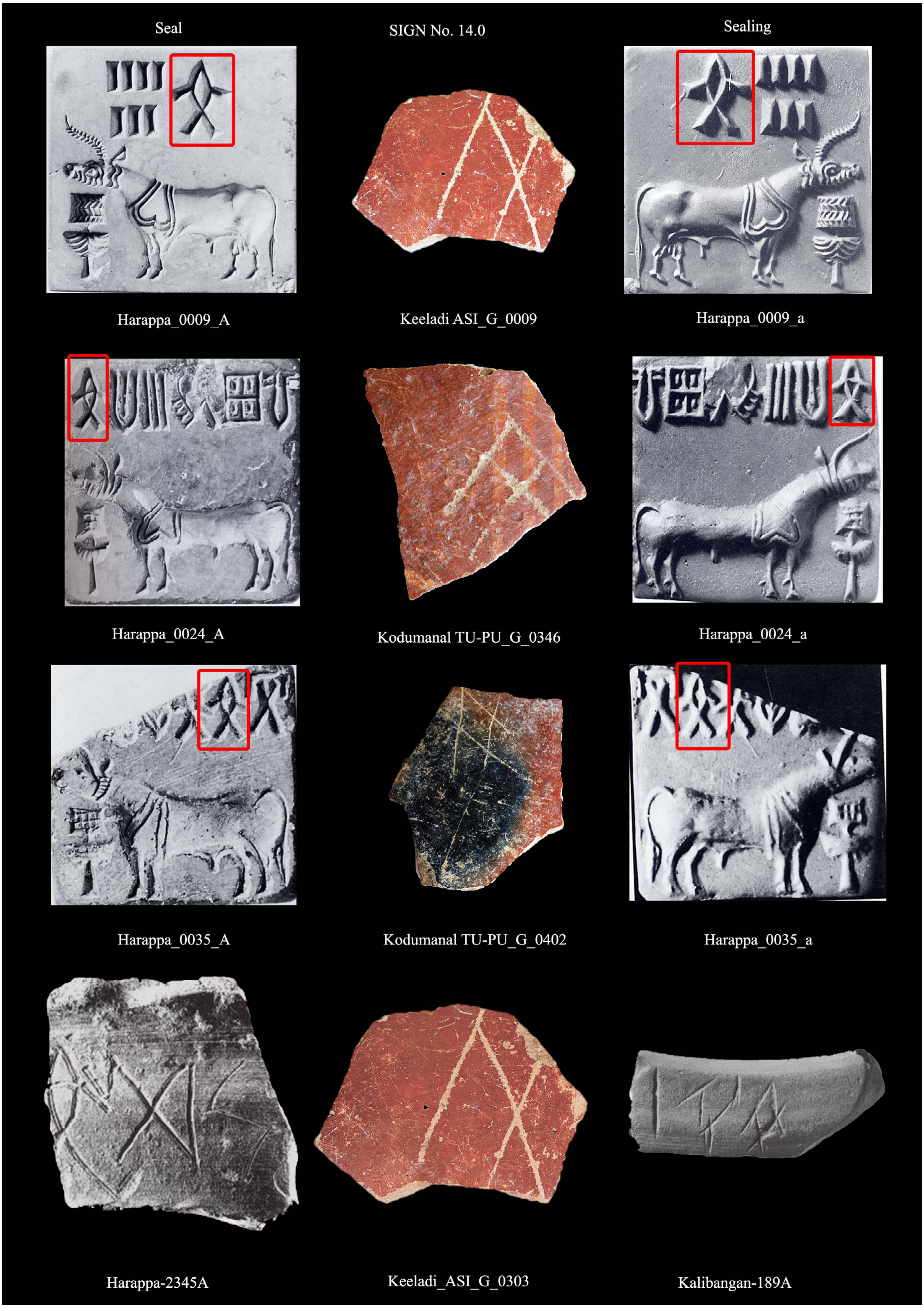
Harappa_0098_a
Mohenjodaro_0037_A
Alagankulam_G_0154
Mohenjodaro_0037_a
Nausharo_0059_A
Korkai_G_0040
Nausharo_0059_(Flipped)
Chanhudaro_0067_A
Keeladi_G_0591
Chanhudaro_0067_a

Fig. 13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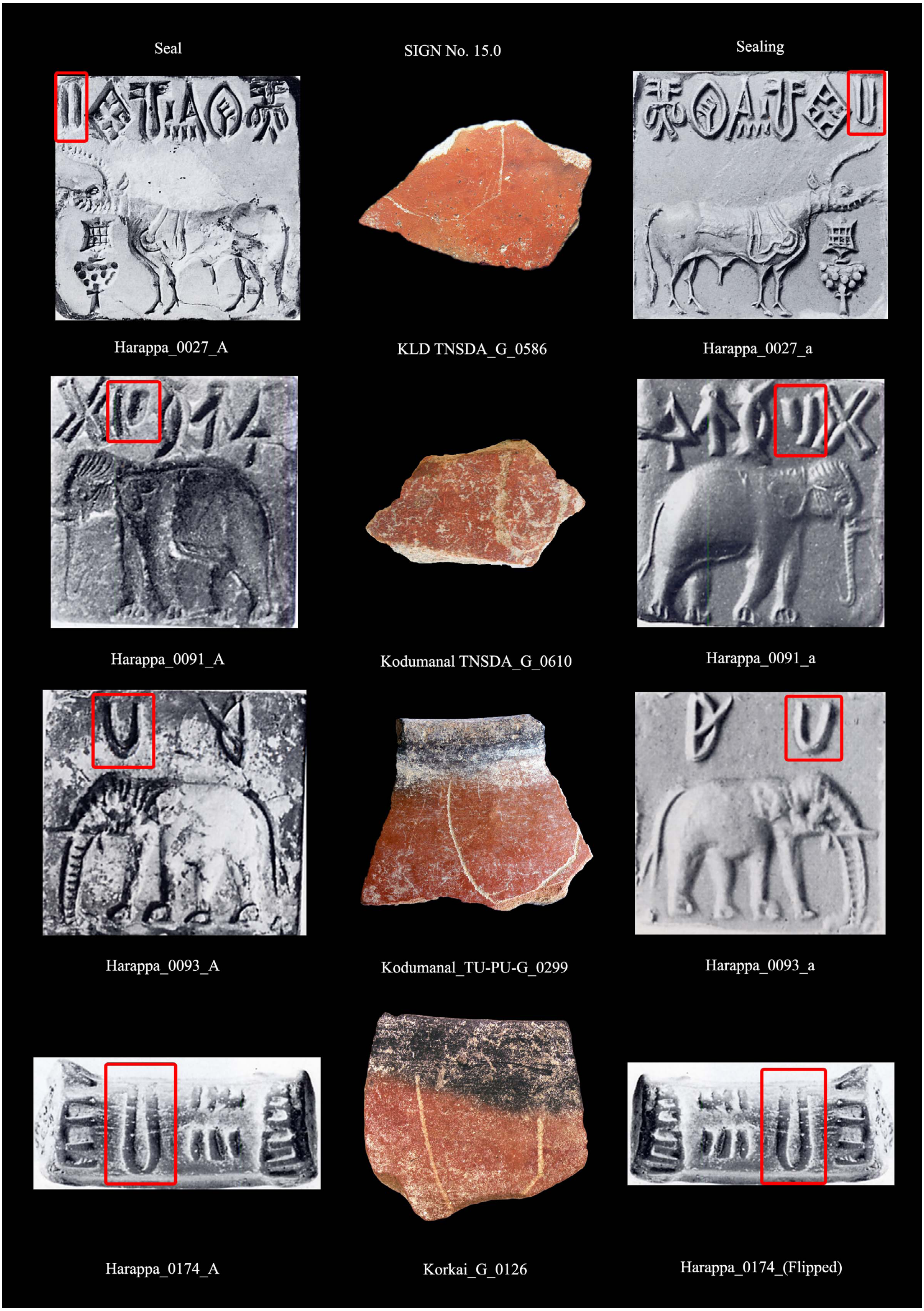
Keeladi ASI_G_0009
Harappa_0009_a
Harappa_0024_A
Kodumanal TU-PU_G_0346
Harappa_0024_a
Harappa_0035_A
Kodumanal TU-PU_G_0402
Harappa_0035_a
Harappa-2345A
Keeladi_ASI_G_0303
Kalibangan-189A

Fig. 14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Harappa_0091_A
Kodumanal TNSDA_G_0610
Harappa_0091_a
Harappa_0093_A
Kodumanal_TU-PU-G_0299
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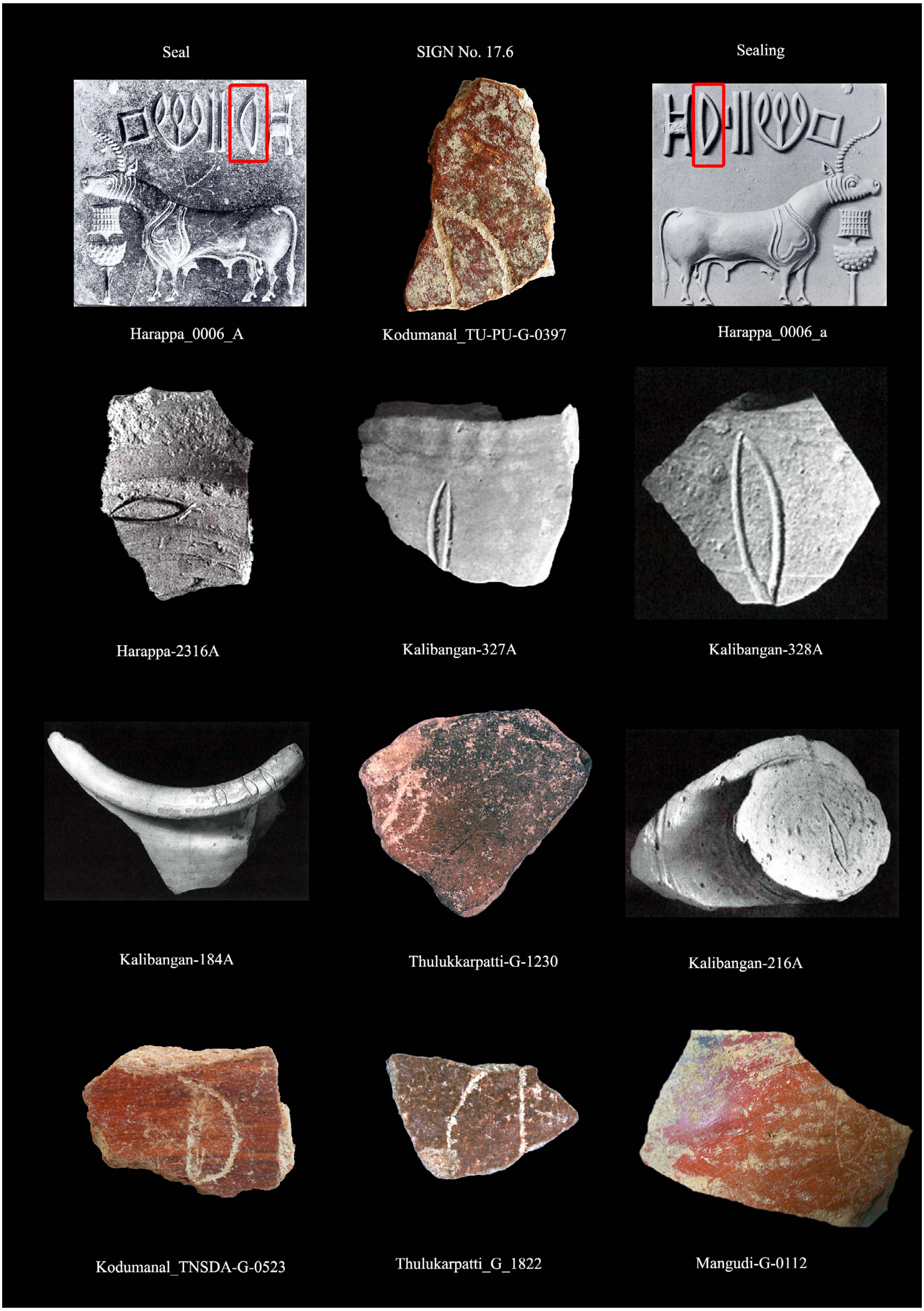
Harappa_0174_A
Korkai_G_0126
Harappa_0174_(Flipped)

Fig. 15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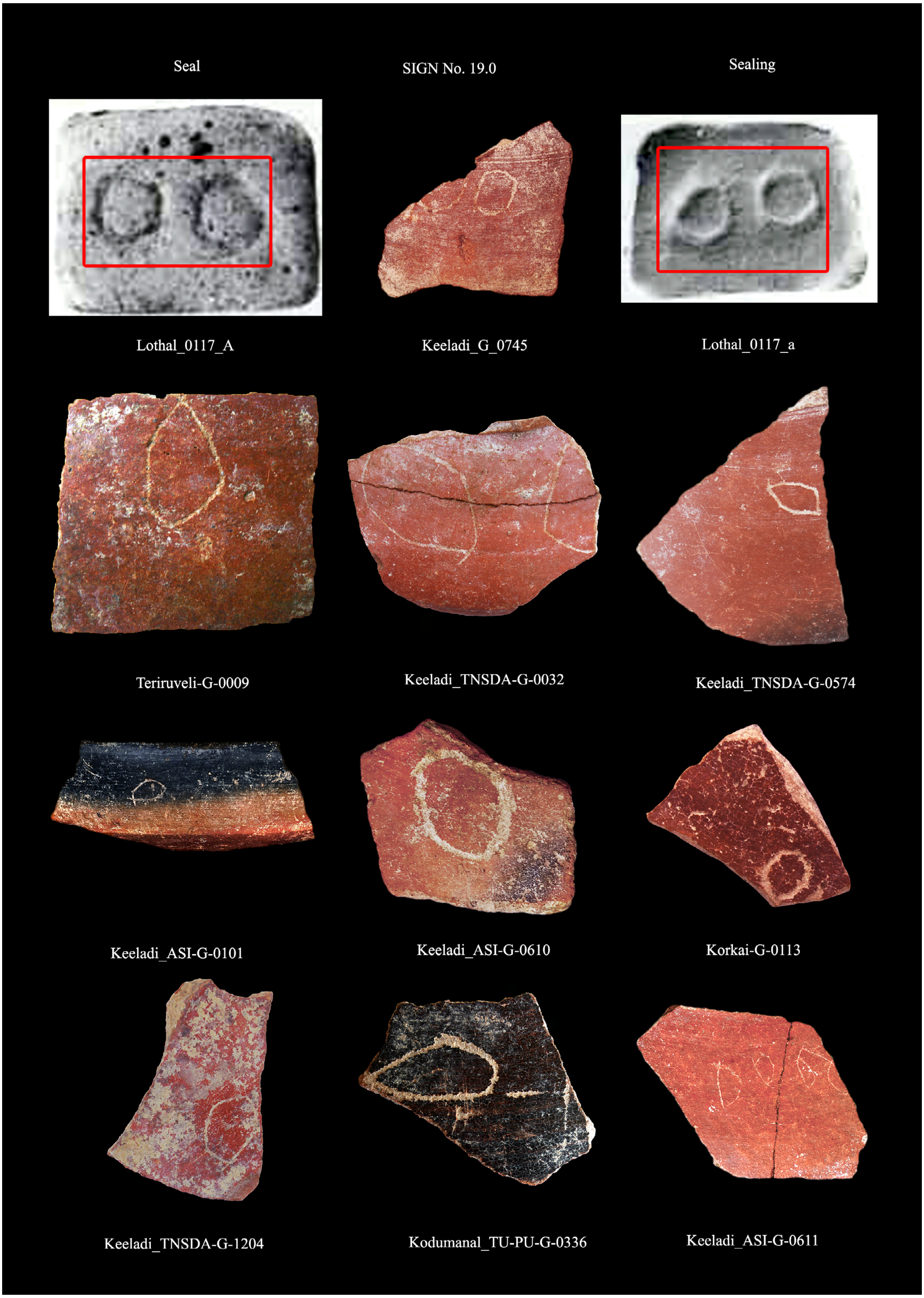
Harappa_0006_a
Harappa-2316A
Kalibangan-327A
Kalibangan-328A
Kalibangan-184A
Thulukkarpatti-G-1230
Kalibangan-216A
Kodumanal_TNSDA-G-0523
Thulukarpatti_G_1822
Mangudi-G-0112

Fig. 16

Seal
SIGN No. 18.0
Sealing
Kalibangan_325_A
Kalibangan_326_A
Kalibangan_324_A
Kodumanal_TU_PU-G-0444
Kodumanal_TU-PU-G-0058
Kodumanal_TU-PU-G-0256
13956
Harappa-1467 A
Harappa-1545 A
Mohenjadaro_1637_A
Korkai-G-0251
Keeladi_TNSDA-G-0881
Kodumanal_TNSDA-G-0798

Fig. 17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SIGN No. 19.0
Sealing
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Keeladi_G_0745
Lothal_0117_a
Teriruveli-G-0009
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Keeladi_TNSDA-G-0574
Keeladi_ASI-G-0101
Keeladi_ASI-G-0610
Korkai-G-0113
Keeladi_TNSDA-G-1204
Kodumanal_TU-PU-G-0336
Keeladi_ASI-G-0611

Fig. 18

Seal
SIGN No. 20.0
Sealing
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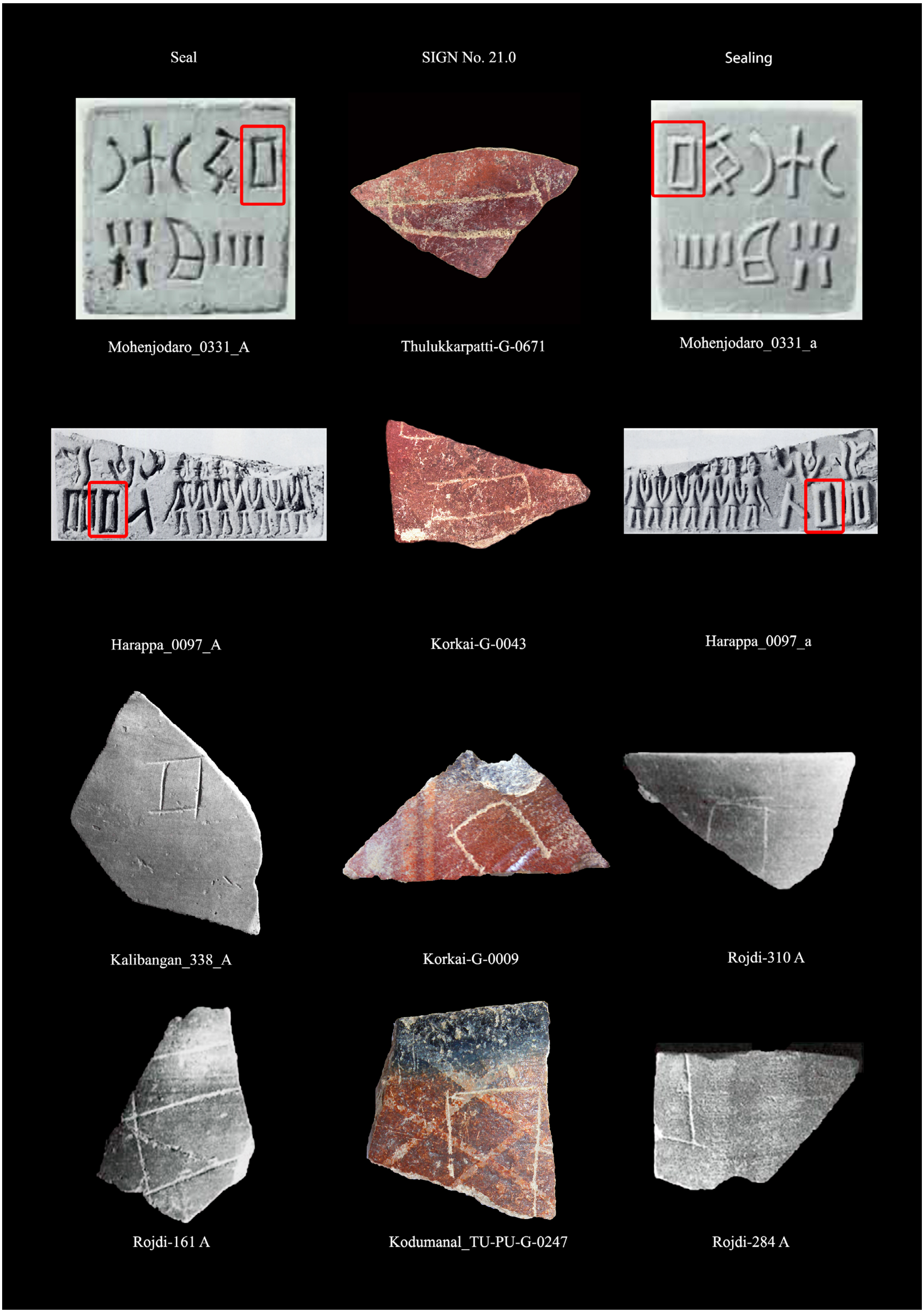
Keeladi ASI_G_0272
Mohenjodaro_0472_a
Kodumanal TNSDA_G_0385
Teriruveli_G_0012
Thulukarpatti_G_0975
Seal
Sign No. 20.5
Sealing
Mohenjodaro_0303_A
Kodumanal_TNSDA-G-0113
Mohenjodaro_0303_a
Mohenjodaro_0314_A
Mangudi-G-0041
Mohenjodaro_0314_a

Fig. 19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Sealing
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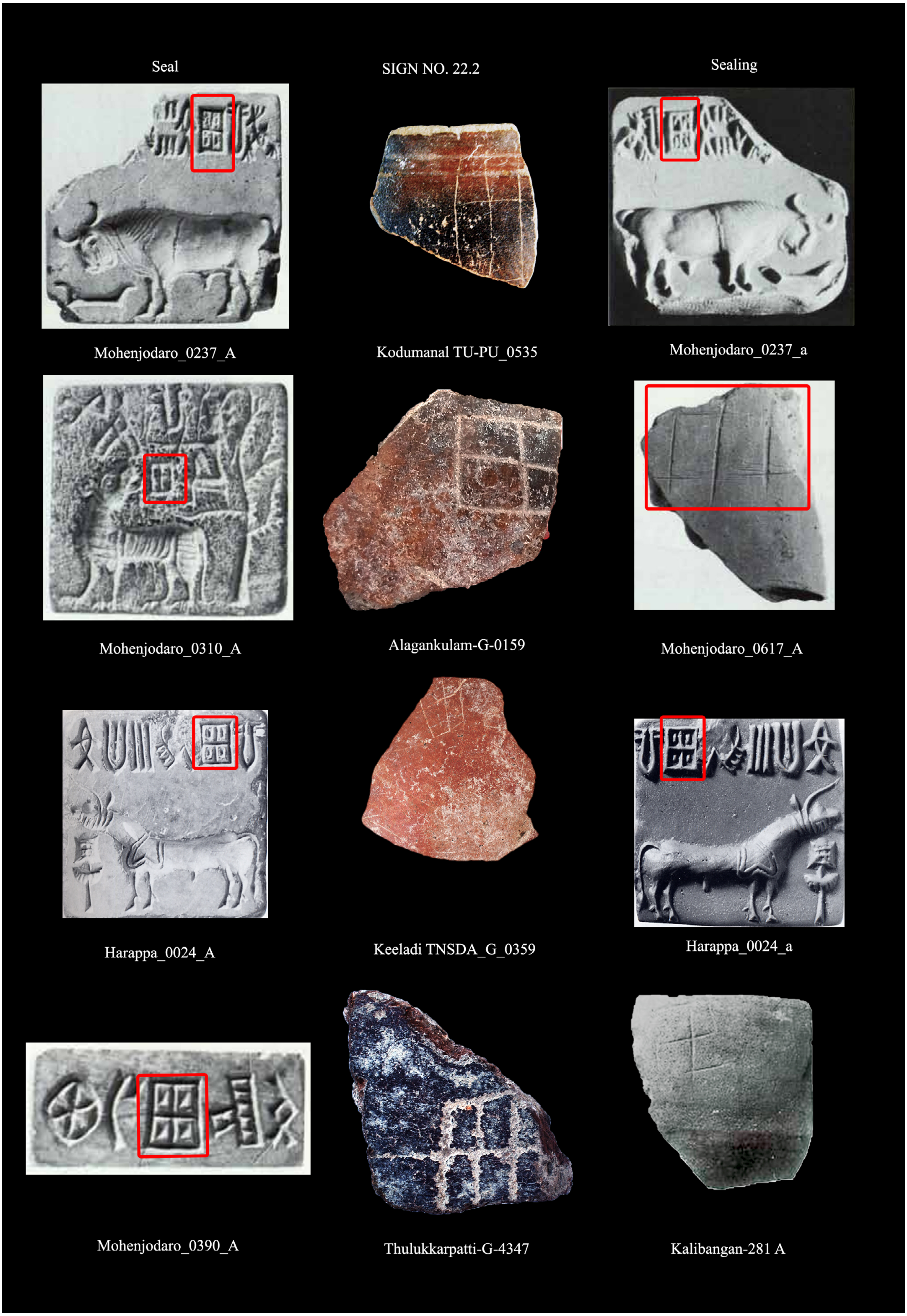
Mohenjodaro_0331_a
Harappa_0097_A
Korkai-G-0043
Harappa_0097_a
Kalibangan_338_A
Korkai-G-0009
Rojdi-310 A
Rojdi-161 A
Kodumanal_TU-PU-G-0247
Rojdi-284 A

Fig. 20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SIGN NO. 22.2
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Alagankulam-G-0159
Mohenjodaro_0617_A
Harappa_0024_A
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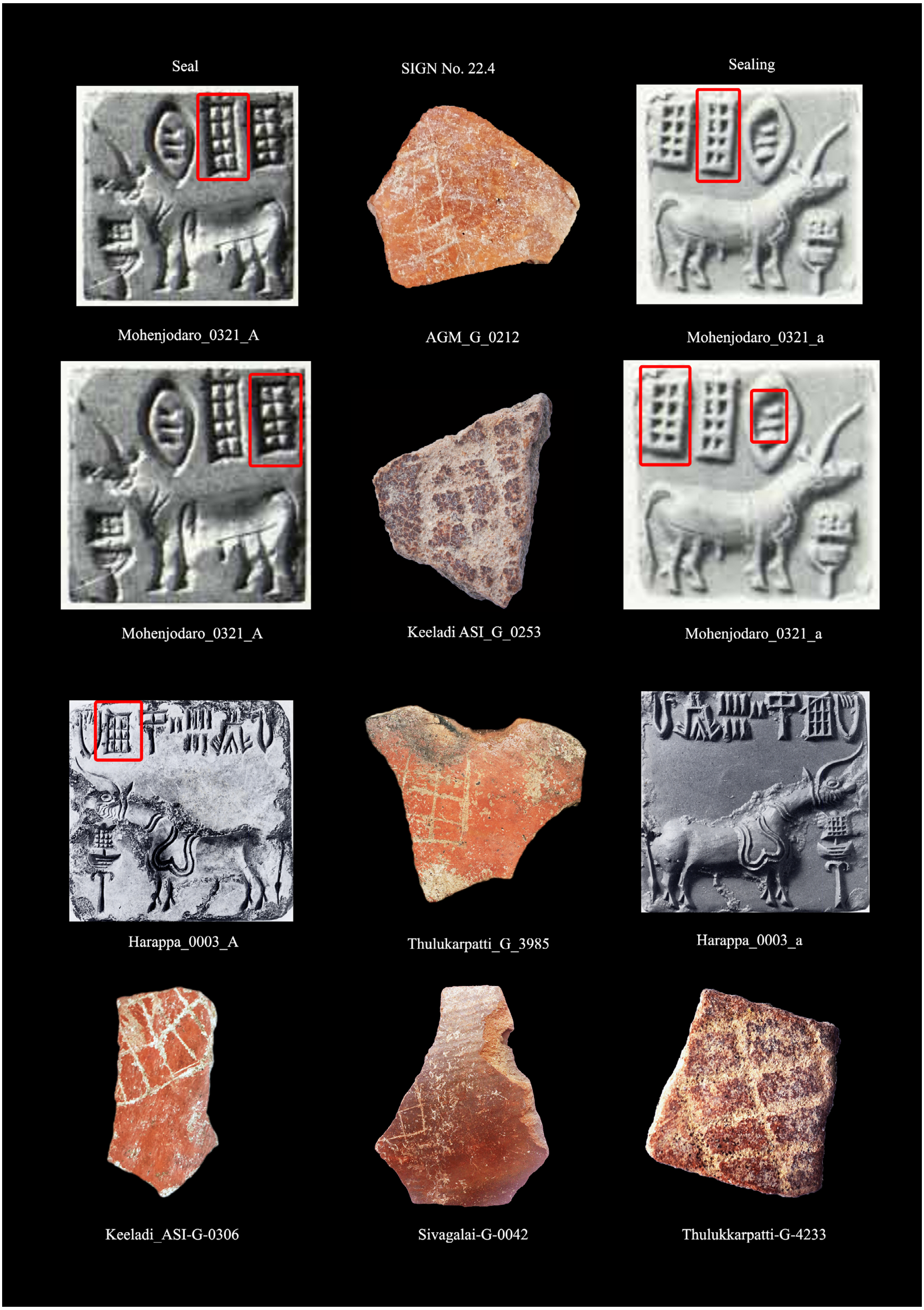
Mohenjodaro_0390_A
Thulukkarpatti-G-4347
Kalibangan-281 A

Fig. 21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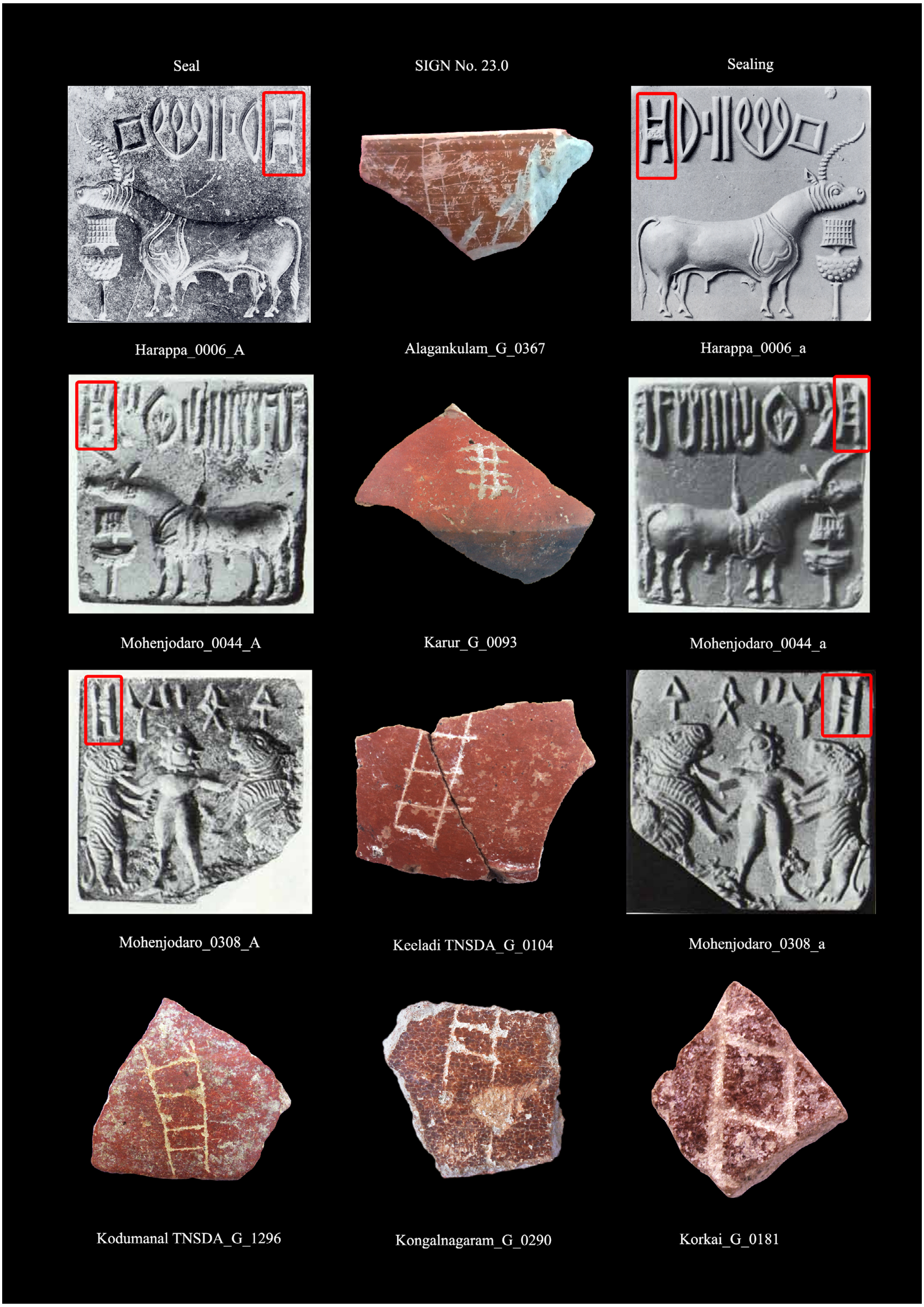
Keeladi ASI_G_0253
Mohenjodaro_0321_a
Harappa_0003_A
Thulukarpatti_G_3985
Harappa_0003_a
Keeladi_ASI-G-0306
Sivagalai-G-0042
Thulukkarpatti-G-4233

Fig. 22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Sealing
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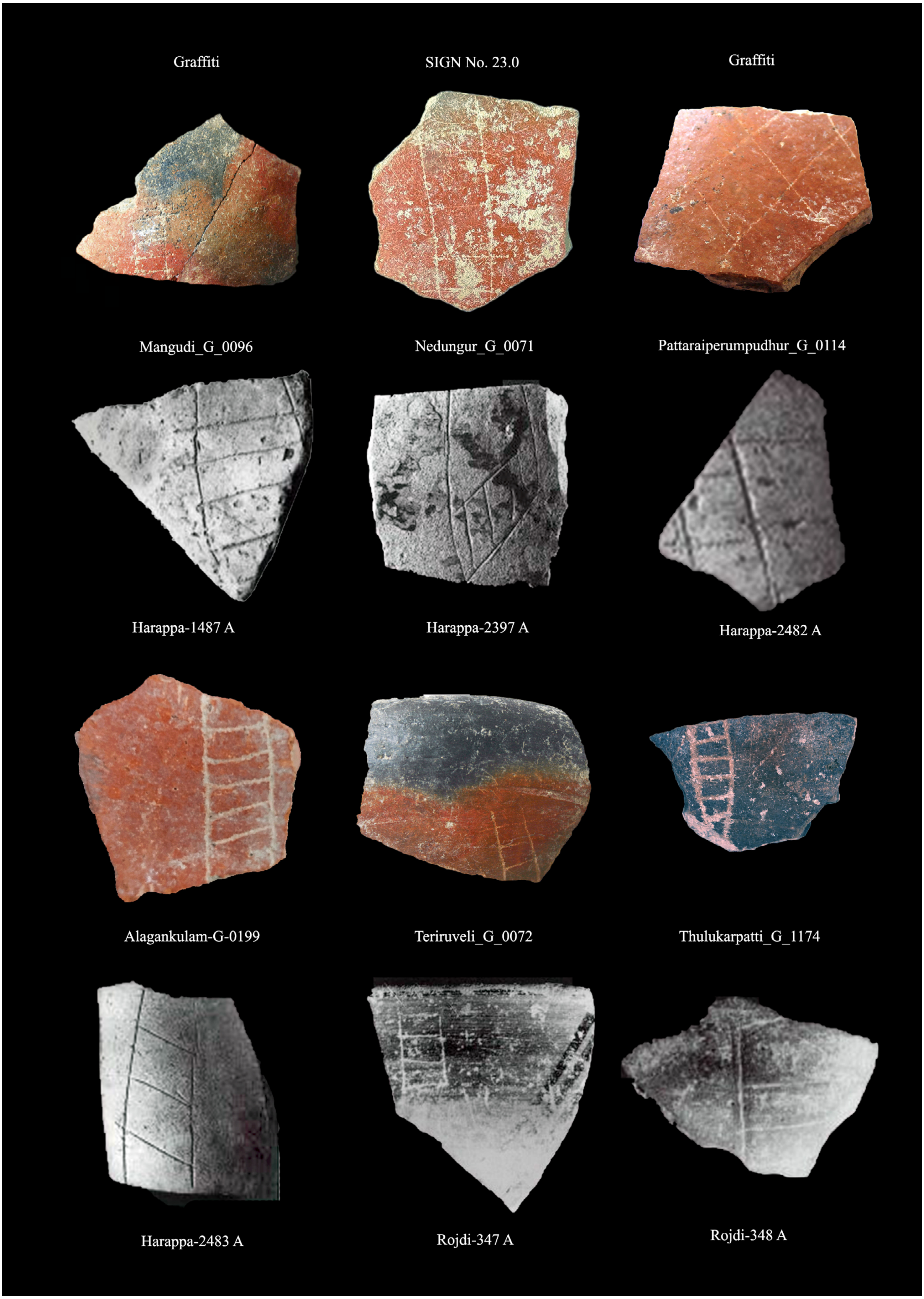
Mohenjodaro_0044_a
Mohenjodaro_0308_A
Keeladi TNSDA_G_0104
Mohenjodaro_0308_a
Kodumanal TNSDA_G_1296
Kongalnagaram_G_0290
Korkai_G_0181

Fig. 23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Nedungur_G_0071
Pattaraiperumpudhur_G_0114
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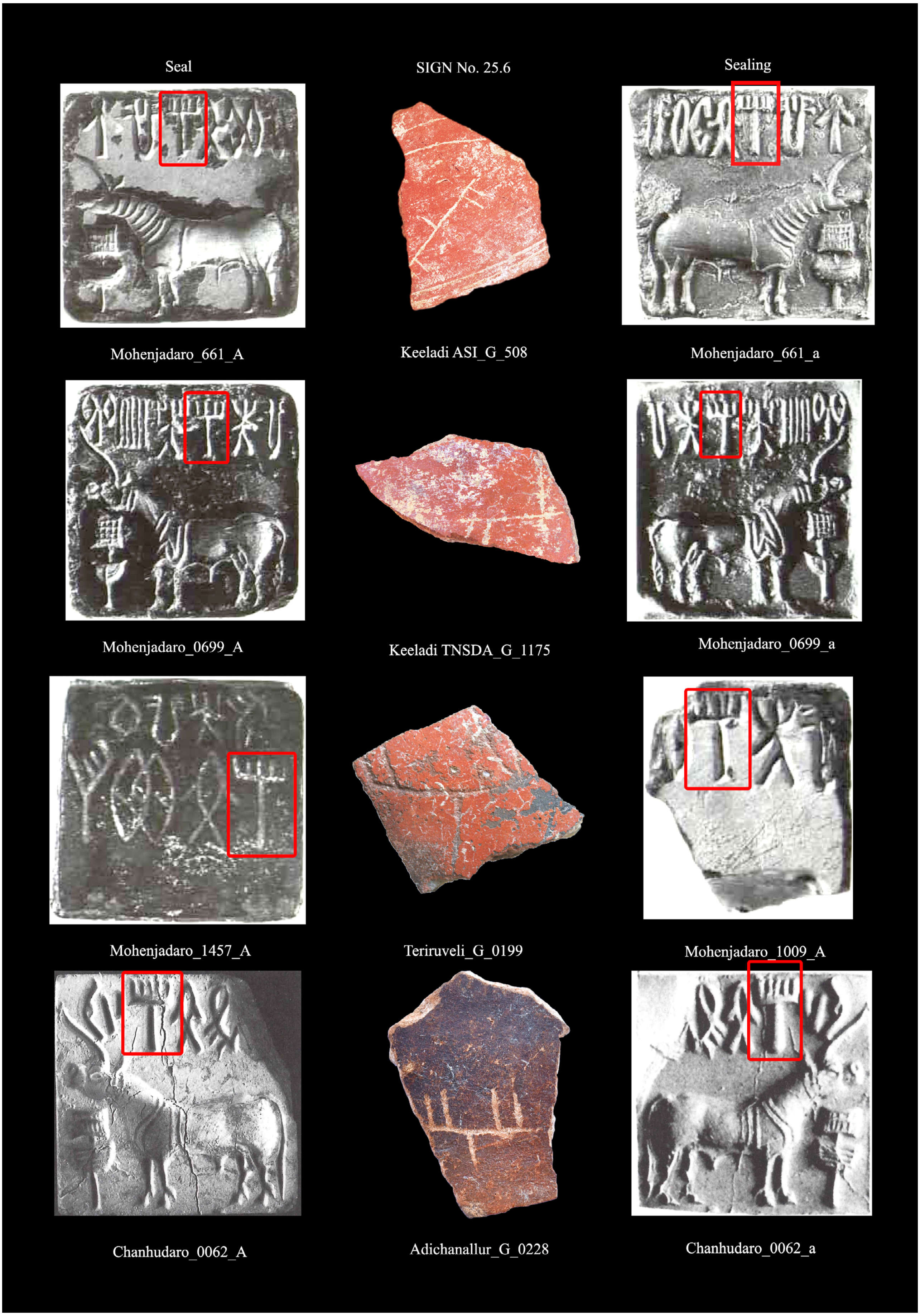
Harappa-2397 A
Harappa-2482 A
Alagankulam-G-0199
Teriruveli_G_0072
Thulukarpatti_G_1174
Harappa-2483 A
Rojdi-347 A
Rojdi-348 A

Fig. 24


Seal
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Sealing
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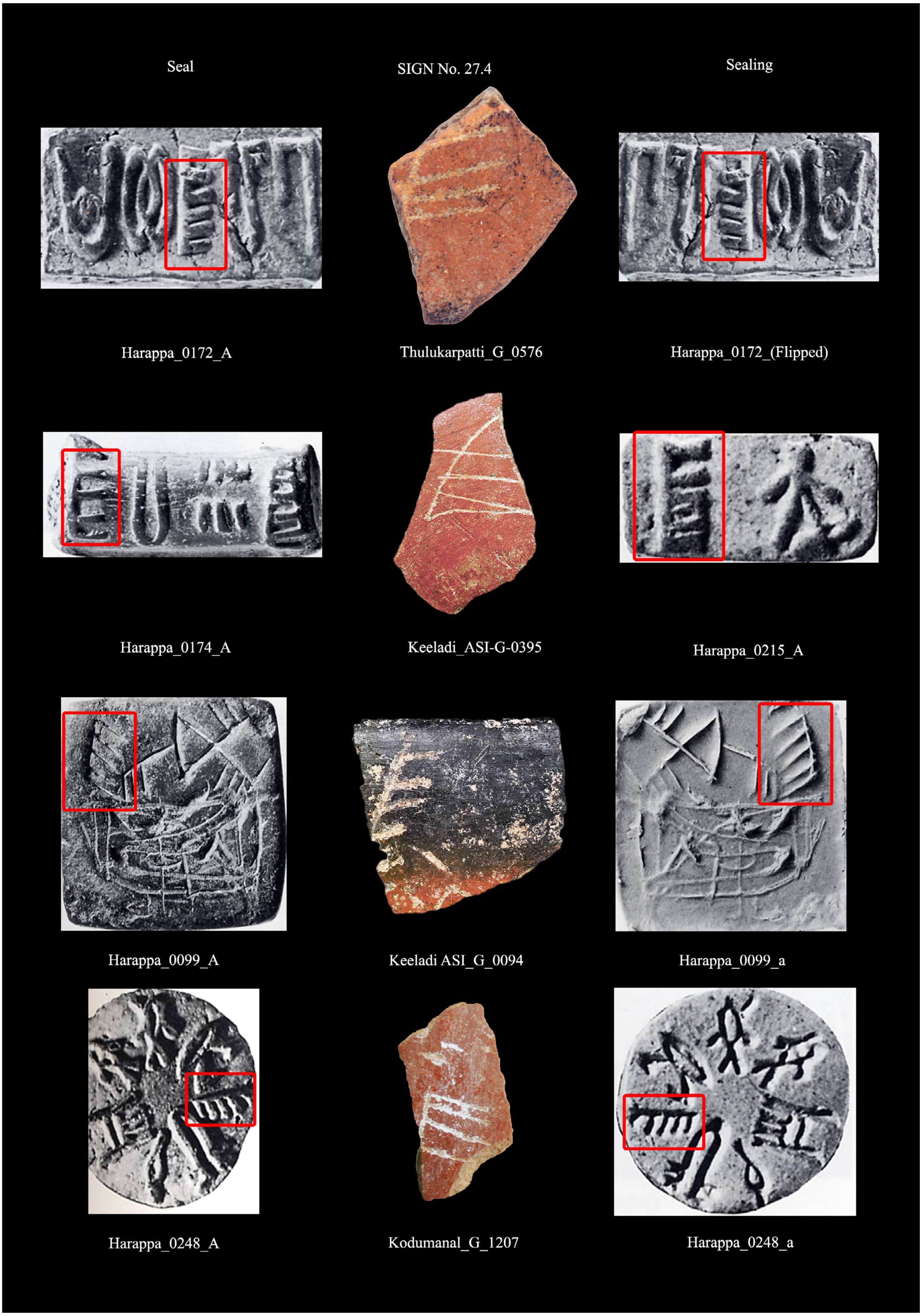
Mohenjadaro_661_a
Mohenjadaro_0699_A
Keeladi TNSDA_G_1175
Mohenjadaro_0699_a
Mohenjadaro_1457_A
Teriruveli_G_0199
Mohenjadaro_1009_A
Chanhudaro_0062_A
Adichanallur_G_0228
Chanhudaro_0062_a

Fig. 25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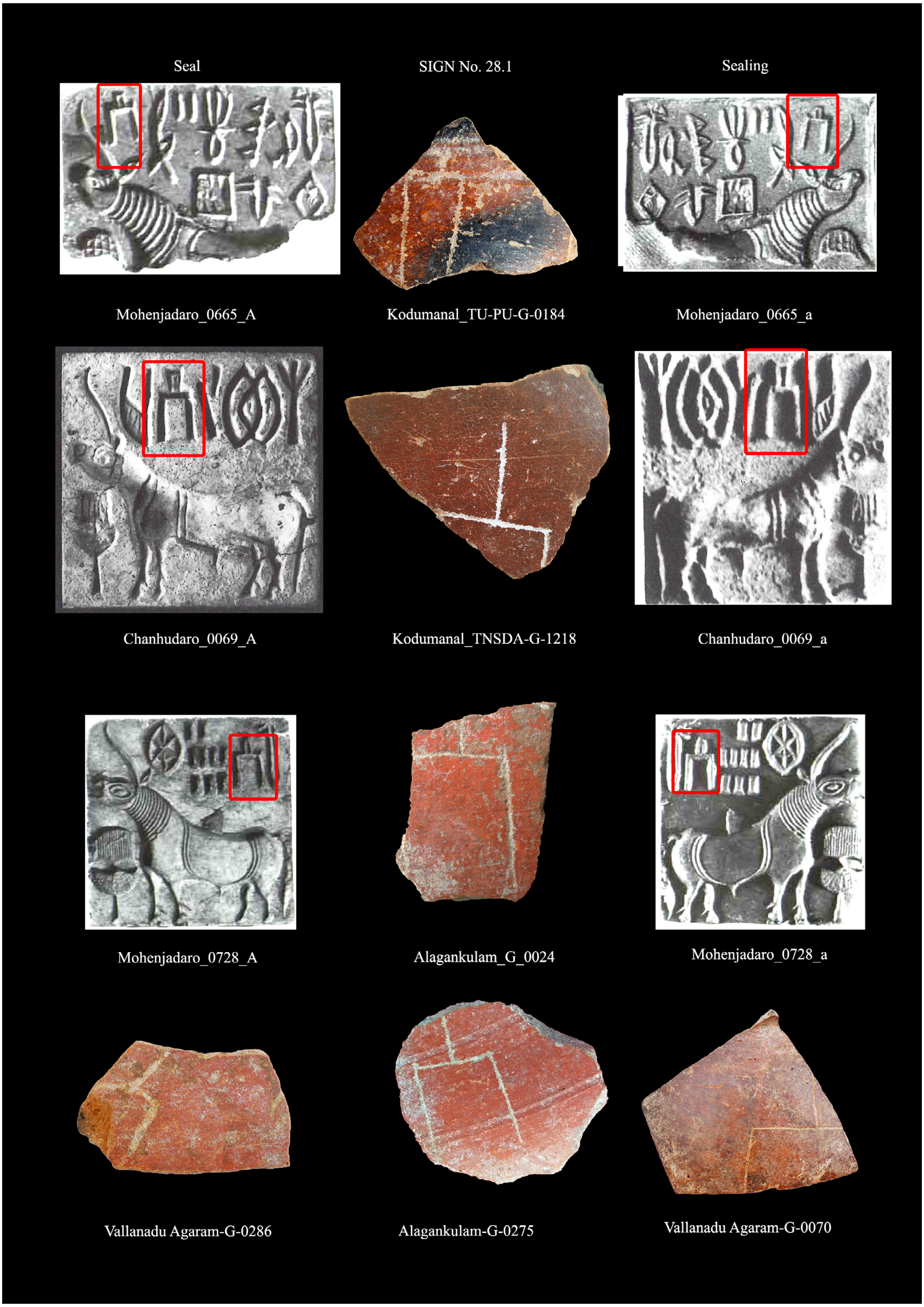
Harappa_0174_A
Keeladi_ASI-G-0395
Harappa_0215_A
Harappa_0099_A
Keeladi ASI_G_0094
Harappa_0099_a
Harappa_0248_A
Kodumanal_G_1207
Harappa_0248_a

Fig. 26


Seal
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Sealing
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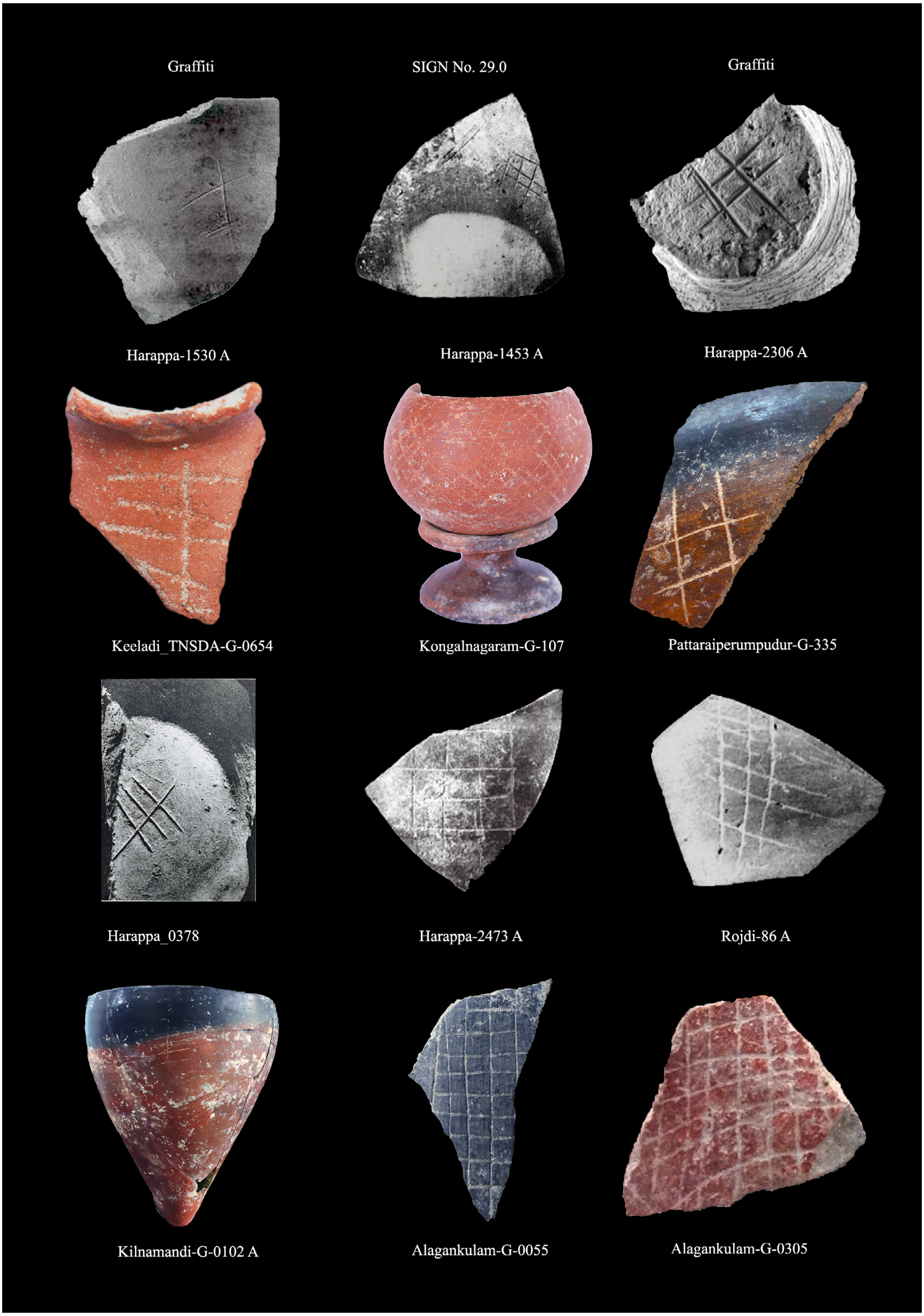
Mohenjadaro_0665_a
Chanhudaro_0069_A
Kodumanal_TNSDA-G-1218
Chanhudaro_0069_a
Mohenjadaro_0728_A
Alagankulam_G_0024
Mohenjadaro_0728_a
Vallanadu Agaram-G-0286
Alagankulam-G-0275
Vallanadu Agaram-G-0070

Fig. 27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Graffiti
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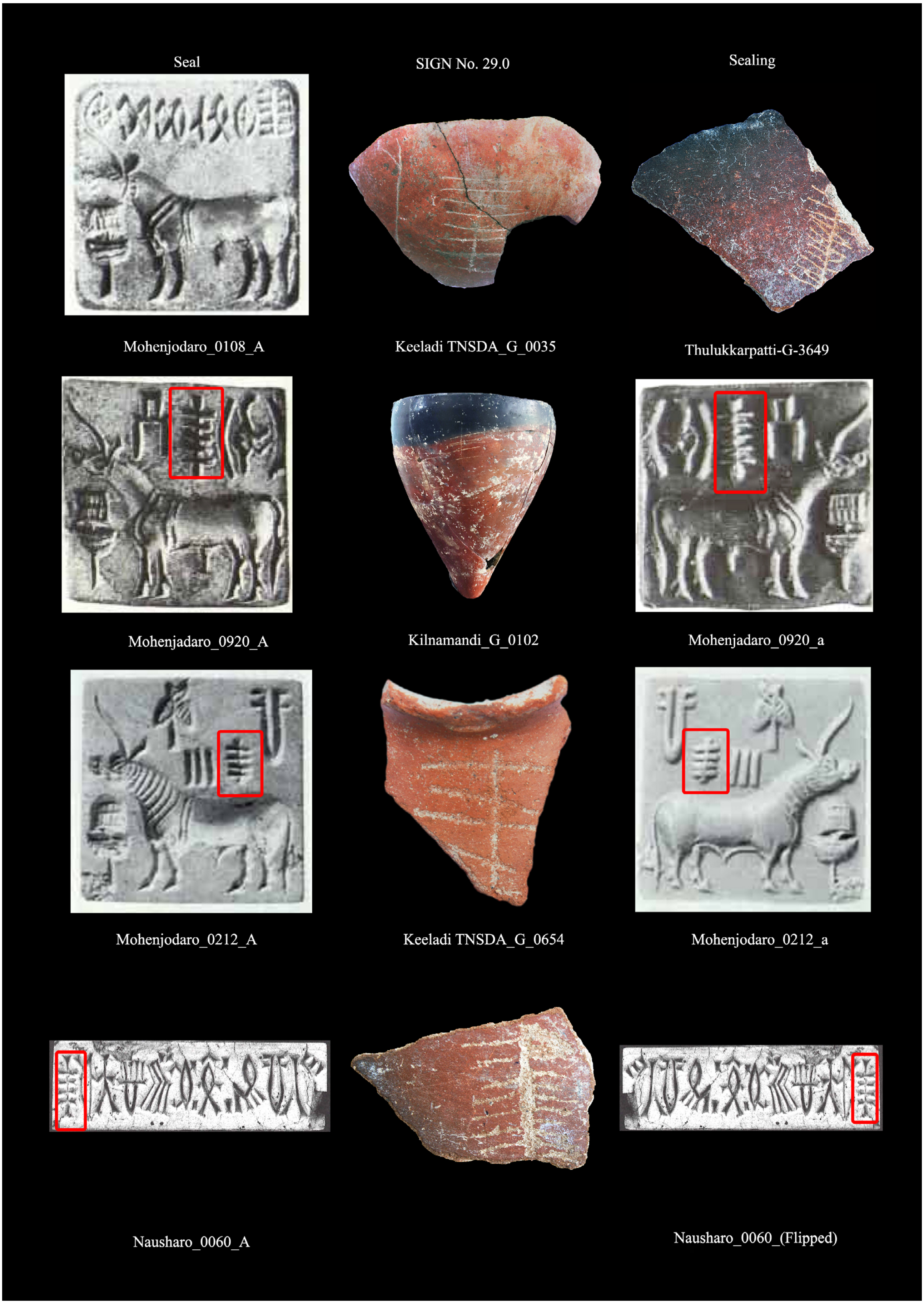
Harappa-1453 A
Harappa-2306 A
Keeladi_TNSDA-G-0654
Kongalnagaram-G-107
Pattaraiperumpudur-G-335
Harappa_0378
Harappa-2473 A
Rojdi-86 A
Kilnamandi-G-0102 A
Alagankulam-G-0055
Alagankulam-G-0305

Fig. 28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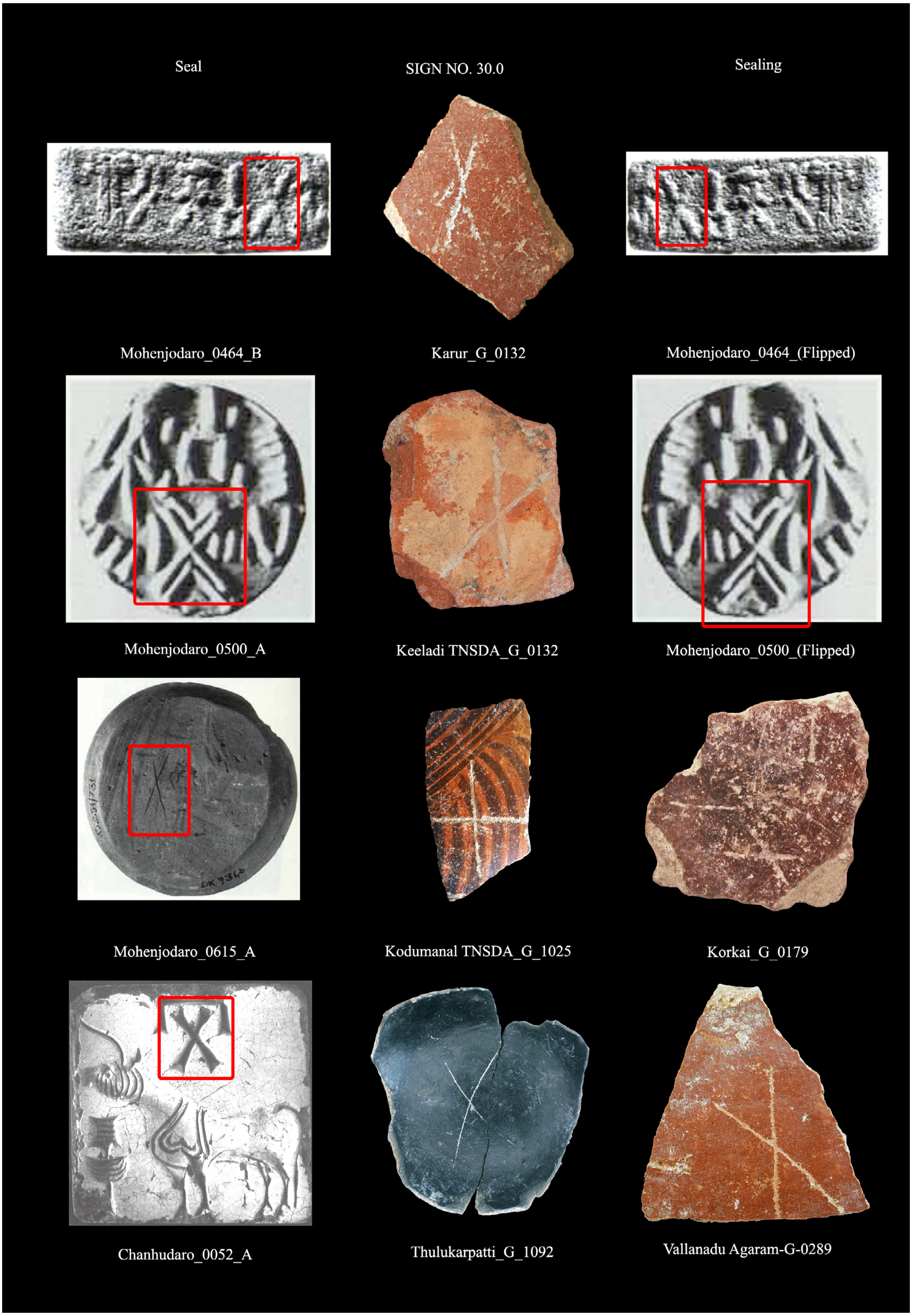
Thulukkarpatti-G-3649
Mohenjadaro_0920_A
Kilnamandi_G_0102
Mohenjadaro_0920_a
Mohenjodaro_0212_A
Keeladi TNSDA_G_0654
Mohenjodaro_0212_a
Nausharo_0060_A
Nausharo_0060_(Flipped)

Fig. 29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Sealing
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Karur_G_0132
Mohenjodaro_0464_(Flipped)
Mohenjodaro_0500_A
Keeladi TNSDA_G_0132
Mohenjodaro_0500_(Flipped)
Mohenjodaro_0615_A
Kodumanal TNSDA_G_1025
Korkai_G_0179
Chanhudaro_0052_A
Thulukarpatti_G_1092
Vallanadu Agaram-G-0289

Fig. 30

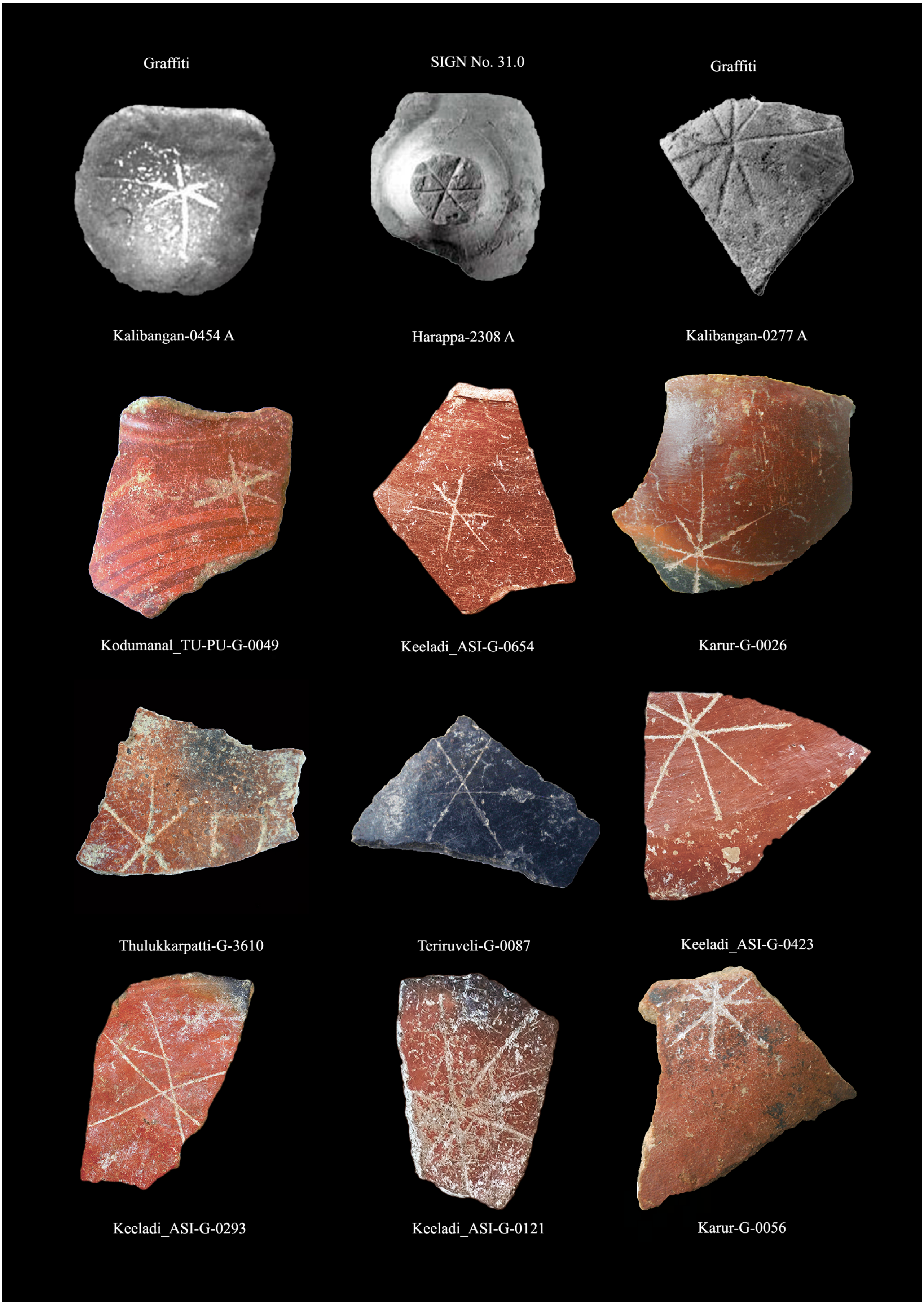
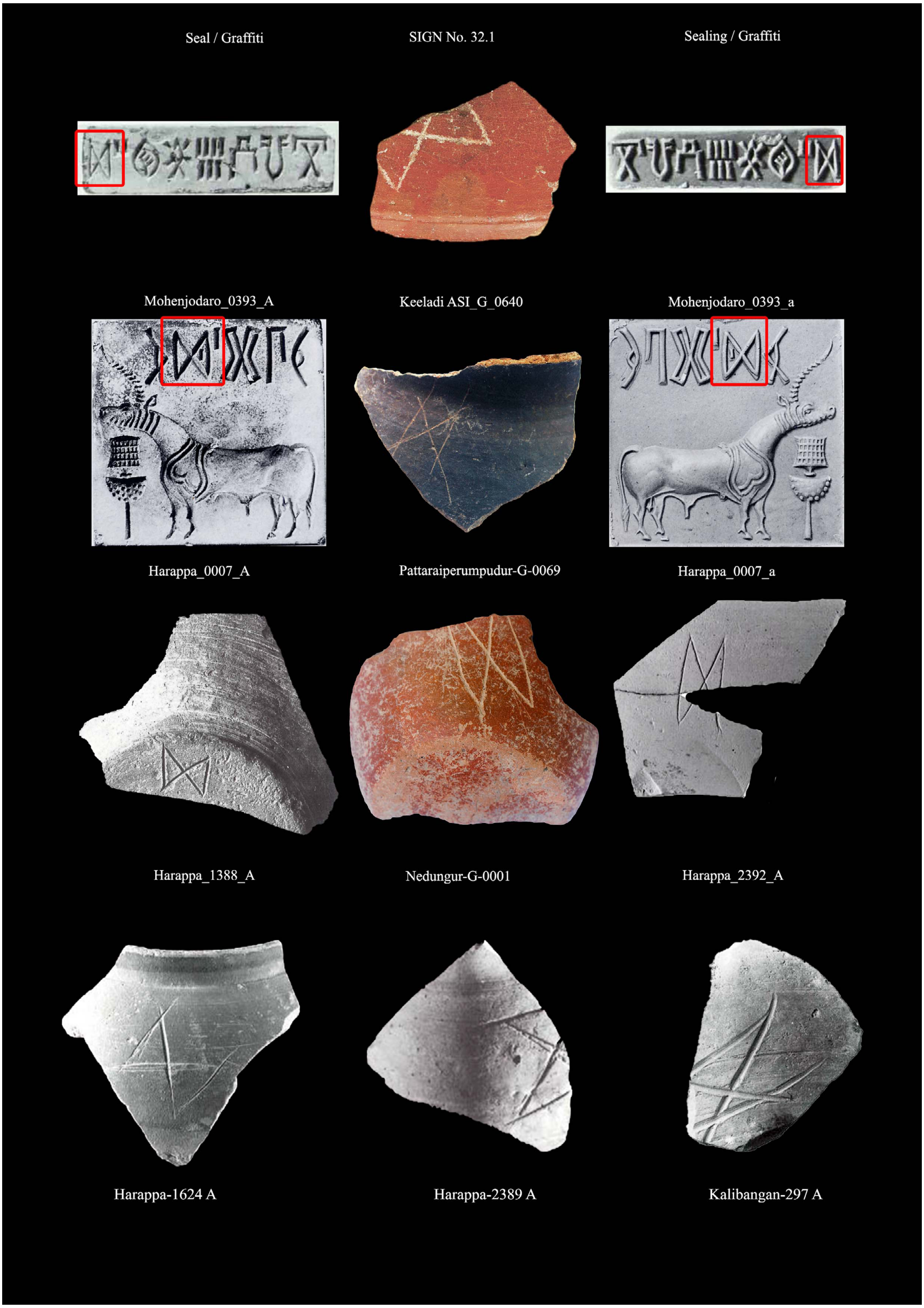

Graffiti
SIGN No. 31.0
Graffiti
Kalibangan-0454 A
Harappa-2308 A
Kalibangan-0277 A
Kodumanal_TU-PU-G-0049
Keeladi_ASI-G-0654
Karur-G-0026
Thulukkarpatti-G-3610
Teriruveli-G-0087
Keeladi_ASI-G-0423
Keeladi_ASI-G-0293
Keeladi_ASI-G-0121
Karur-G-0056

Fig. 31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Sealing / Graffiti
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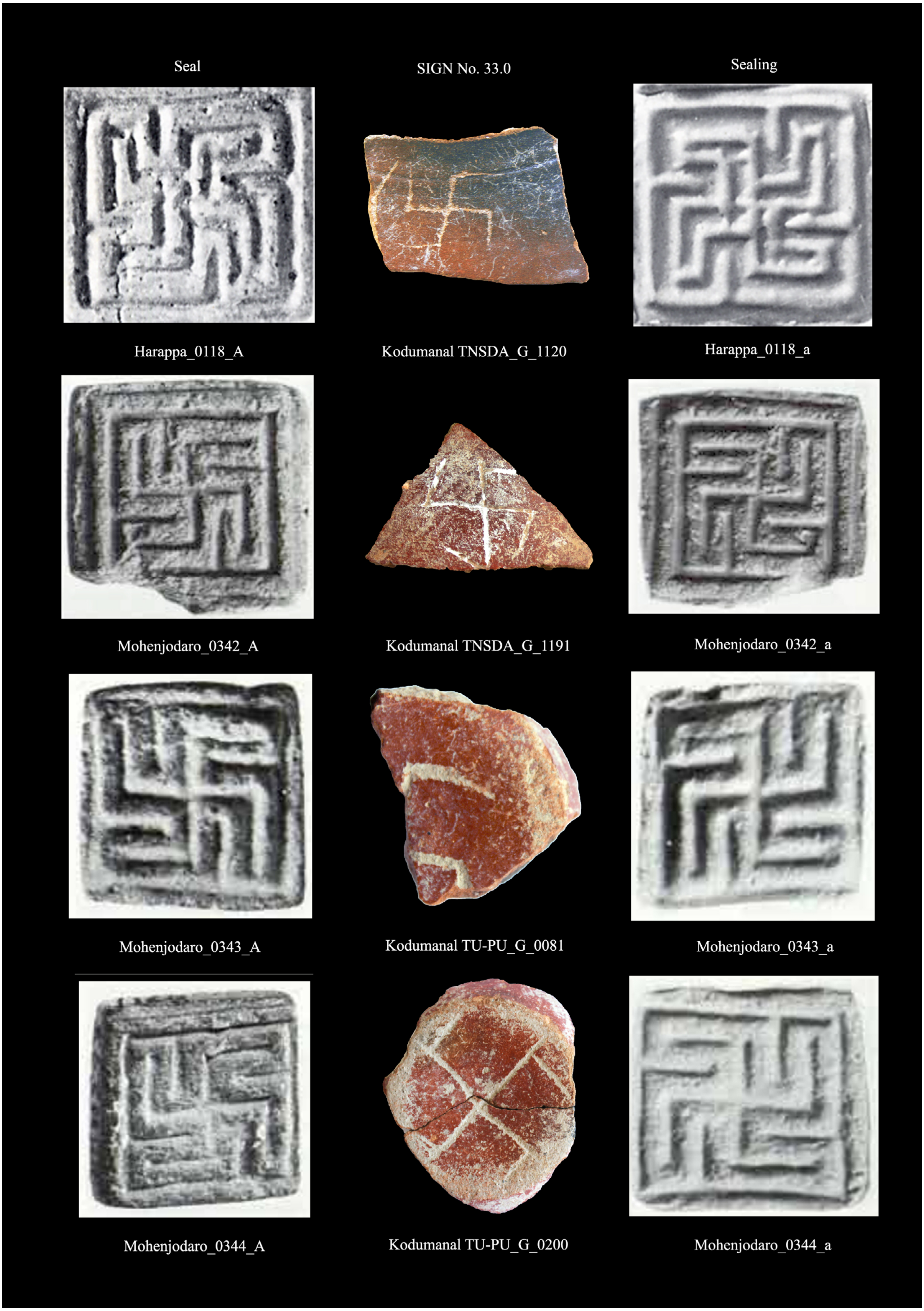
Keeladi ASI_G_0640
Mohenjodaro_0393_a
Harappa_0007_A
Pattaraiperumpudur-G-0069
Harappa_0007_a
Harappa_1388_A
Nedungur-G-0001
Harappa_2392_A
Harappa-1624 A
Harappa-2389 A
Kalibangan-297 A

Fig. 32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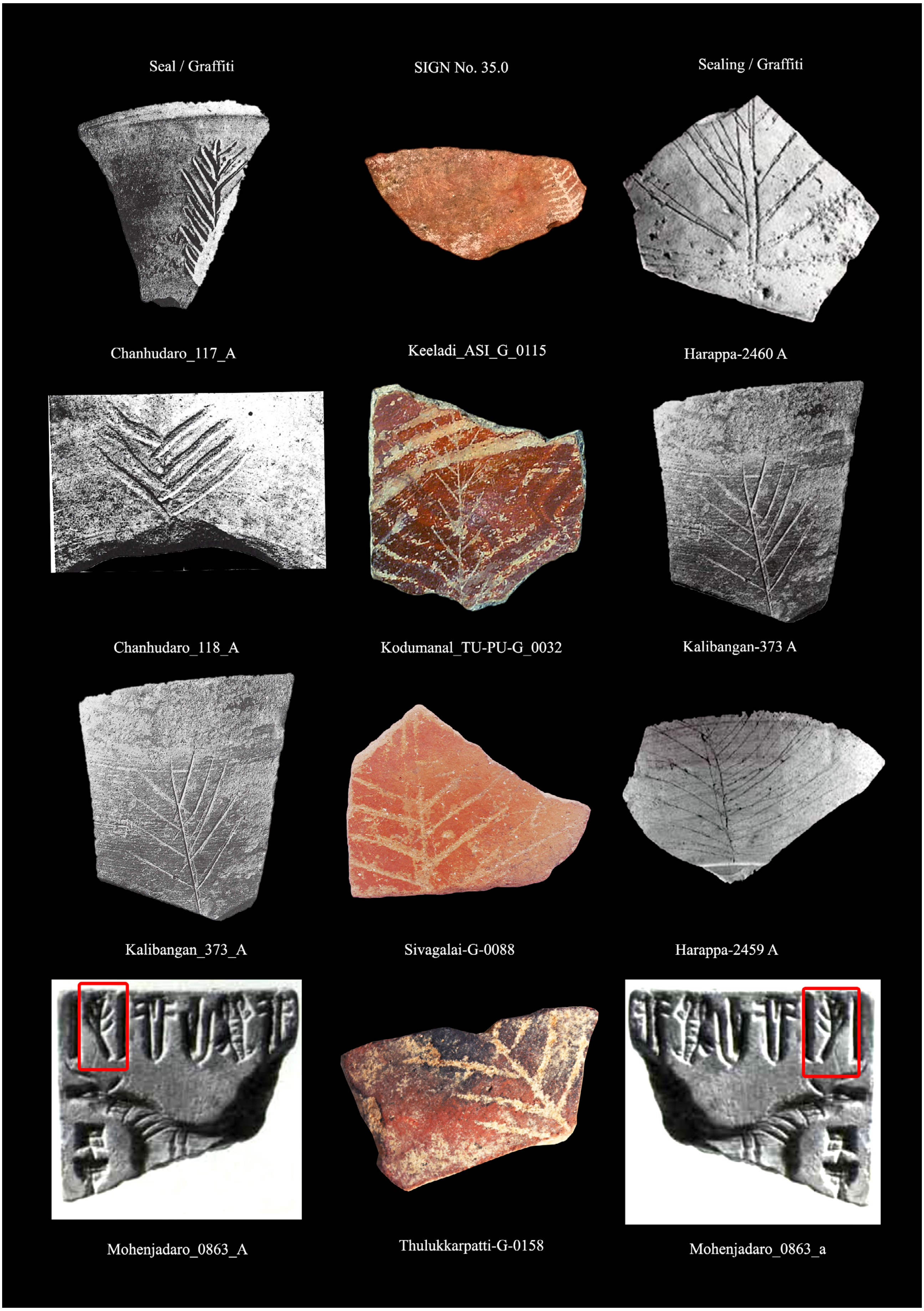
Sealing
Harappa_0118_A
Kodumanal TNSDA_G_1120
Harappa_0118_a
Mohenjodaro_0342_A
Kodumanal TNSDA_G_1191
Mohenjodaro_0342_a
Mohenjodaro_0343_A
Kodumanal TU-PU_G_0081
Mohenjodaro_0343_a
Mohenjodaro_0344_A
Kodumanal TU-PU_G_0200
Mohenjodaro_0344_a

Fig. 33

Seal
SIGN NO. 34.0
Sealing
Mohenjadaro_0751_A
Thulukarpatti_G_0063
Mohenjadaro_0751_a
Korkai_G_0063
Keeladi TNSDA_G_0751
Vallanadu Agaram_G_0298
Mohenjadaro_0665_A
Kodumanal TNSDA_G_0665
Mohenjadaro_1133_A
Kongalnagaram_G_0048
Mohenjadaro_1133_a

Fig. 34


Seal / Graffiti
SIGN No. 35.0
Sealing / Graffiti
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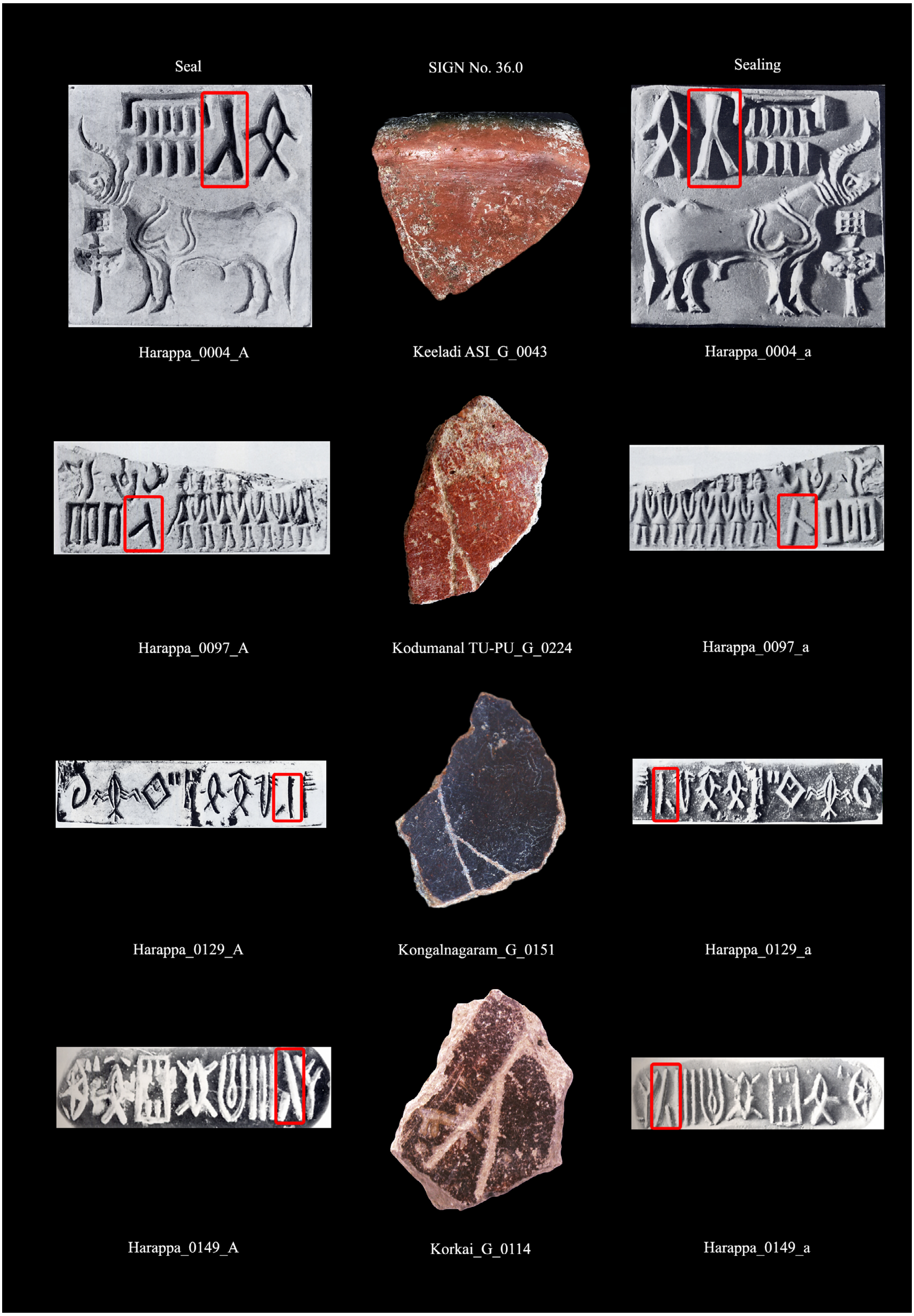
Keeladi_ASI_G_0115
Harappa-2460 A
Chanhudaro_118_A
Kodumanal_TU-PU-G_0032
Kalibangan-373 A
Kalibangan_373_A
Sivagalai-G-0088
Harappa-2459 A
Mohenjadaro_0863_A
Thulukkarpatti-G-0158
Mohenjadaro_0863_a

Fig. 35


Seal
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Sealing
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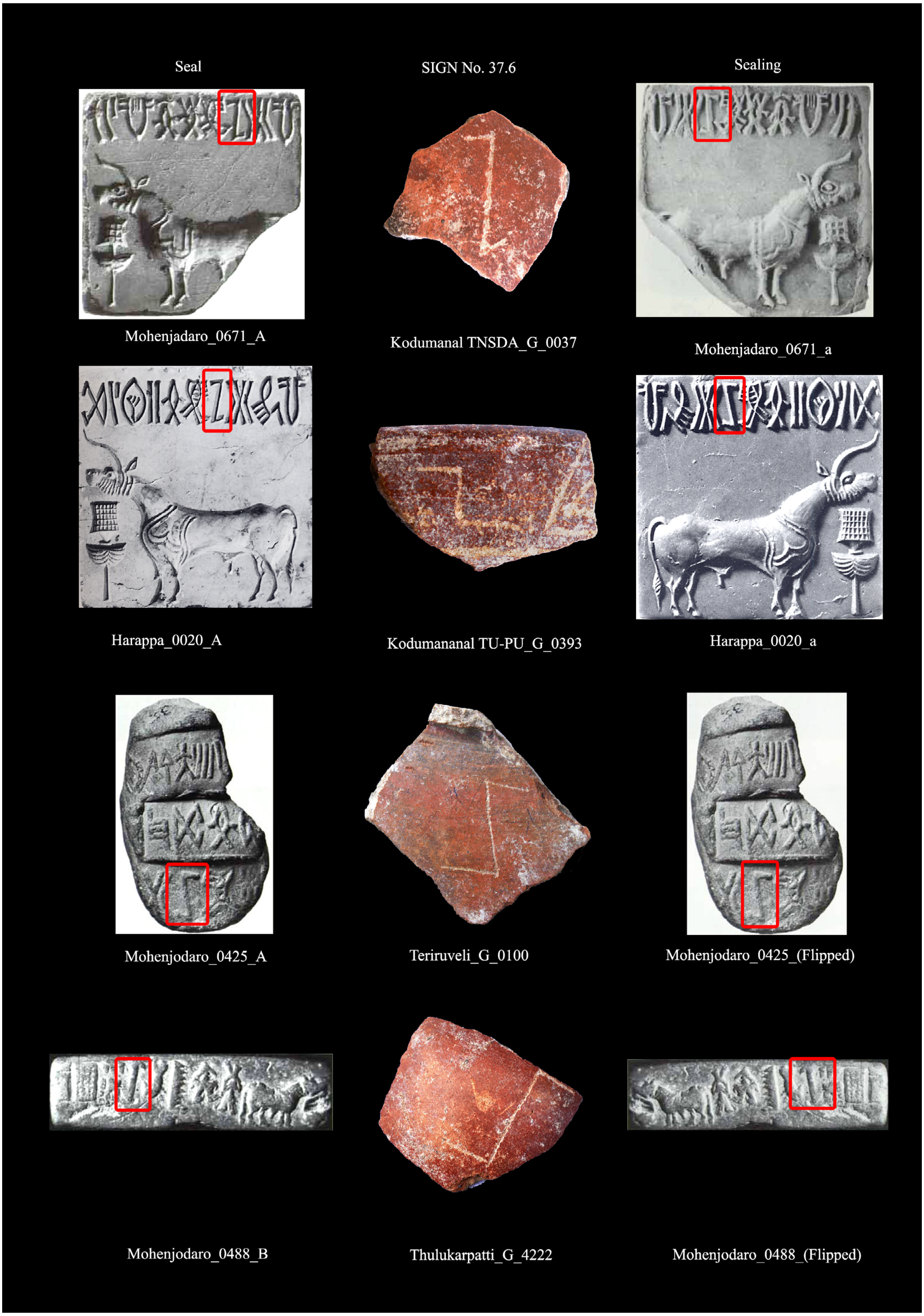
Keeladi ASI_G_0043
Harappa_0004_a
Harappa_0097_A
Kodumanal TU-PU_G_0224
Harappa_0097_a
Harappa_0129_A
Kongalnagaram_G_0151
Harappa_0129_a
Harappa_0149_A
Korkai_G_0114
Harappa_0149_a

Fig. 36


Seal
SIGN No. 37.6
Scaling
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Kodumanal TNSDA_G_0037
Mohenjadaro_0671_a
Harappa_0020_A
Kodumananal TU-PU_G_0393
Harappa_0020_a
Mohenjodaro_0425_A
Teriruveli_G_0100
Mohenjodaro_0425_(Flipped)
Mohenjodaro_0488_B
Thulukarpatti_G_4222
Mohenjodaro_0488_(Flipped)

Fig. 37

the fish in full form is generally found independently, which are designated as field symbols (sign 44.0 to 50.0). Thus, the following concordance tabulated below may give the nature of the content and its wider implications for understanding the graffiti marks as a writing system.

Direction of writing

The analysis of the text represented in the sealing such as the cramping at the left end of the line in need of space, overflow of the last sign or signs to the right end of the second line, overlapping of the right over the left sign led to the conclusion that the direction of writing is right to left but whether the contemporary non-Indus script or signs were written from right to left or left to right is not well demonstrated. But, nearly 8% of the available text in the seal followed reverse writing (Mahadevan 1977:10). However, the Iron Age graffiti signs of Tamil Nadu were written from left to right. The position of graffiti at the end of the Tamil̠-Brāhmī inscription and overriding signs or superimposition of the scratches suggest that they were written from left to right (Figs. 38 and 39).

The Indus seals and artefacts were reported in the cultural zones of Mesopotamian civilization but in India, as recent studies suggested, several resource zones met the needs of the Indus communities by supplying food products, raw materials and finished goods (Map 2). One hardly gets any Indus material in these supply zones. Indus traders might have had intensive direct commercial contact with the Mesopotamians, and the trade wind must have been in favour of Indus traders. The non-availability of Mesopotamian artefacts in Indus sites suggests that trade might have been handled by Indus traders and the balance of trade in favour of IVC traders. The commercial benefit led to the settlements of Harappans in the West. Such a situation might not have prevailed in other parts of India, leading to the absence of Harappan artefacts in supply zones. The occurrences of identical graffiti marks in South-India suggest a kind of cultural contact. One needs a few more tangible data to support or strengthen the view. The recent chronometric dates indicate that when the Indus Valley experienced the Copper Age, South-India experienced the Iron Age. In this sense, the Iron Age of South-India and the Copper Age of the Indus are contemporary. If both are contemporary, there is a possibility of cultural "exchanges either through direct or intermediate zones. The existence of identical graffiti marks could be understood or explained under this prescription. The occurrence of a large number of carnelian and agate beads and high-tin bronze objects, particularly from Iron Age graves, gives a clue to the contacts, as carnelian, agate, copper, and tin have to come from the north. However, a few more cultural items are required to prove them convincingly. The documentation of graffiti-inscribed potsherds is one such item that needs close attention. Future explorations, excavations, scientific investigations and historical linguistic analysis may give a better picture of these thought-provoking cultural and linguistic issues.

Fig. 38

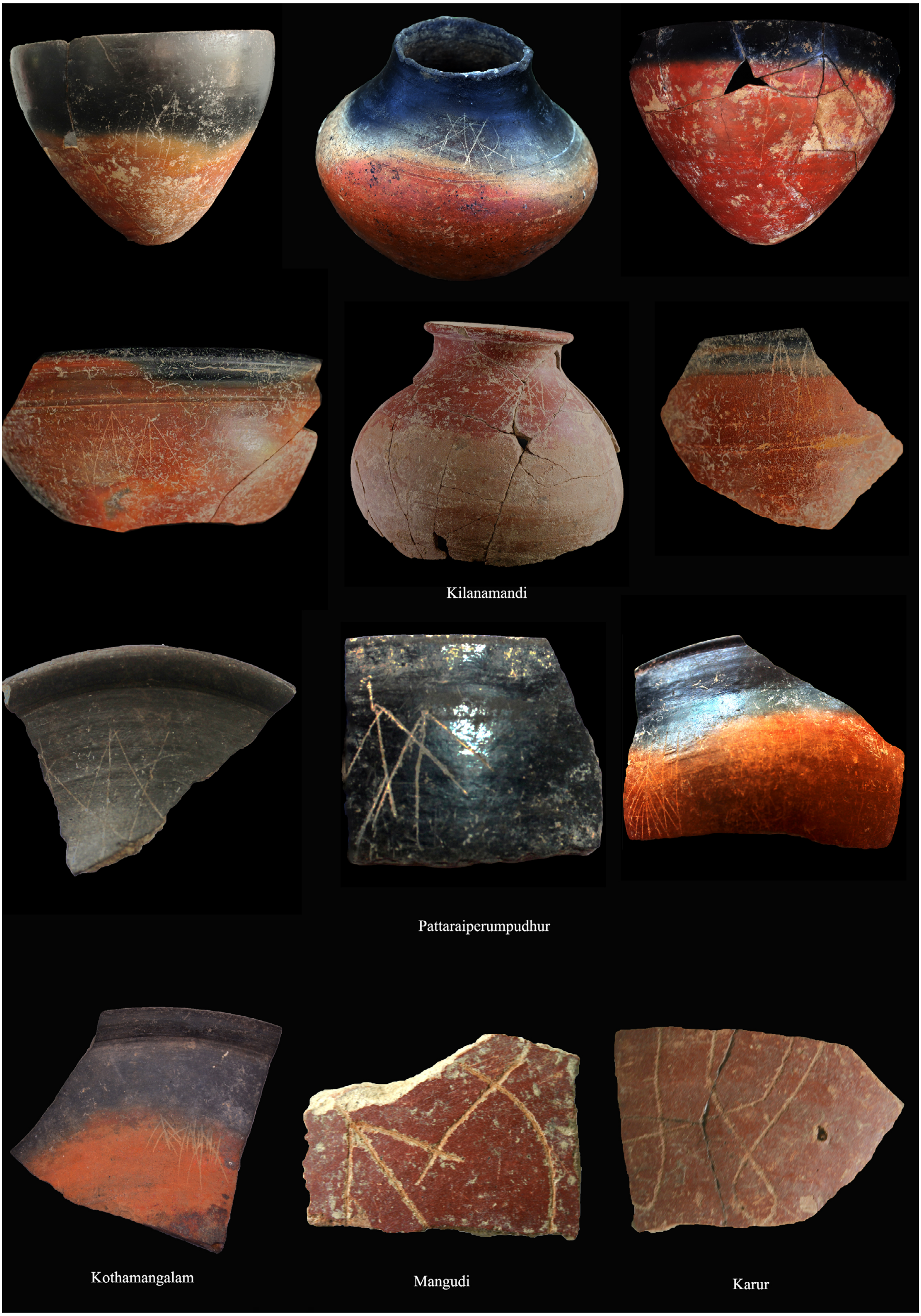
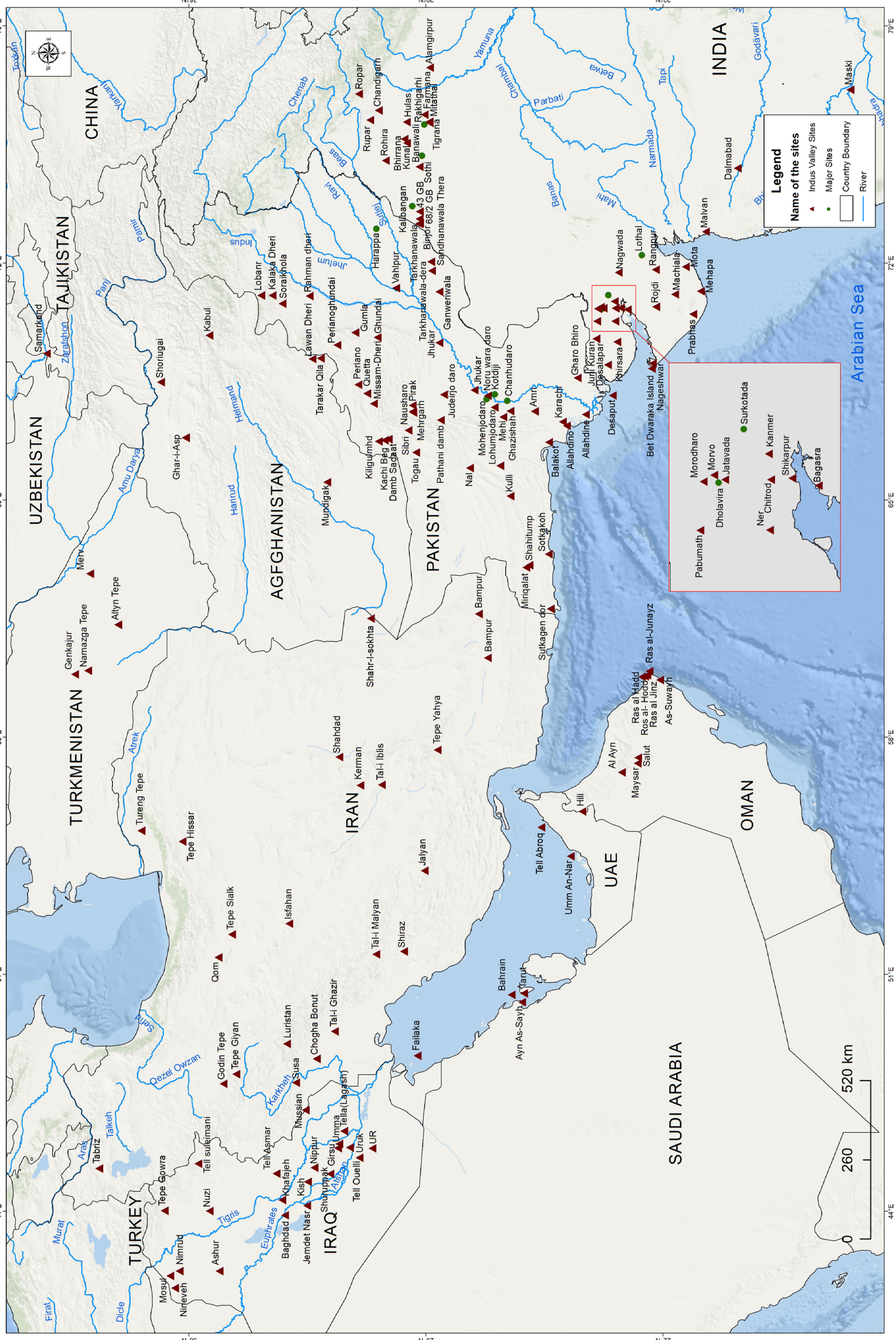

Kilanamandi
Pattaraiperumpudhur
Kothamangalam
Mangudi
Karur

Fig. 39



Map 2: Indus Valley Sites

Bibilography

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Seals of the Indus Tradition: Current Perspectives and Future Goals

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Introduction

The Indus or Harappan Civilization (2600-1900 BCE) is one of the world's earliest and most unique urban cultures. There are over 1500 known sites, including at least 5 major urban centers, which are widely distributed across north-western India and Pakistan (Figure 1). Originally thought to have originated through connections or colonization from Western Asia, today we understand that the development and character of the Indus were the result of local cultural developments, not diffusion from the west (Agrawal 2007; Kenoyer 1998; Wright 2010). The people of the Indus lived in well-planned settlements with sophisticated architecture and water management systems, produced a wide variety of distinctive forms of material culture, and participated in complex regional and interregional exchange networks. Unlike contemporary societies in Mesopotamia and Egypt, there is little archaeological or iconographic evidence for widespread conflict or powerful rulers. All these features distinguish the Indus and exemplify its unique and exceptional character during the third Millennium BCE.

There are perhaps no forms of Indus material culture more well-known and culturally diagnostic than inscribed seals. The most common of these are square stamp seals made of fired steatite that are engraved and usually contain a short inscription and accompanying animal motif. Of the latter, the unicorn is the most common, a bovid easily identifiable by its single horn. While the meaning and purpose of the icon is not known, it was clearly meant to be distinct from other animals with two horns because it also appears on painted pottery and fired terracotta objects (Kenoyer 2013).

Indus unicorn seals (and square stamp seals more broadly) are often described as highly standardized and uniform (Frenez 2018; Green 2020; Kenoyer 1998) and they are in as much as a) they are usually made of fired steatite; b) appear to have been produced using similar production technologies; and c) usually contain a shared set of compositional features (inscriptions, animals, and objects in front of the animals). All these features distinguish them from seals of other ancient cultures, and the fact they have been recovered

in varying quantities at many sites clearly demonstrates shared knowledge of how to make and use them, likely in important administrative activities (Frenez 2018).

On the other hand, considering that seals were made and used for a long time and over great distances during the Indus Tradition, there is bound to be variation within the full corpus, and this is what our research focuses on. We use multi-faceted approaches to investigate how seal

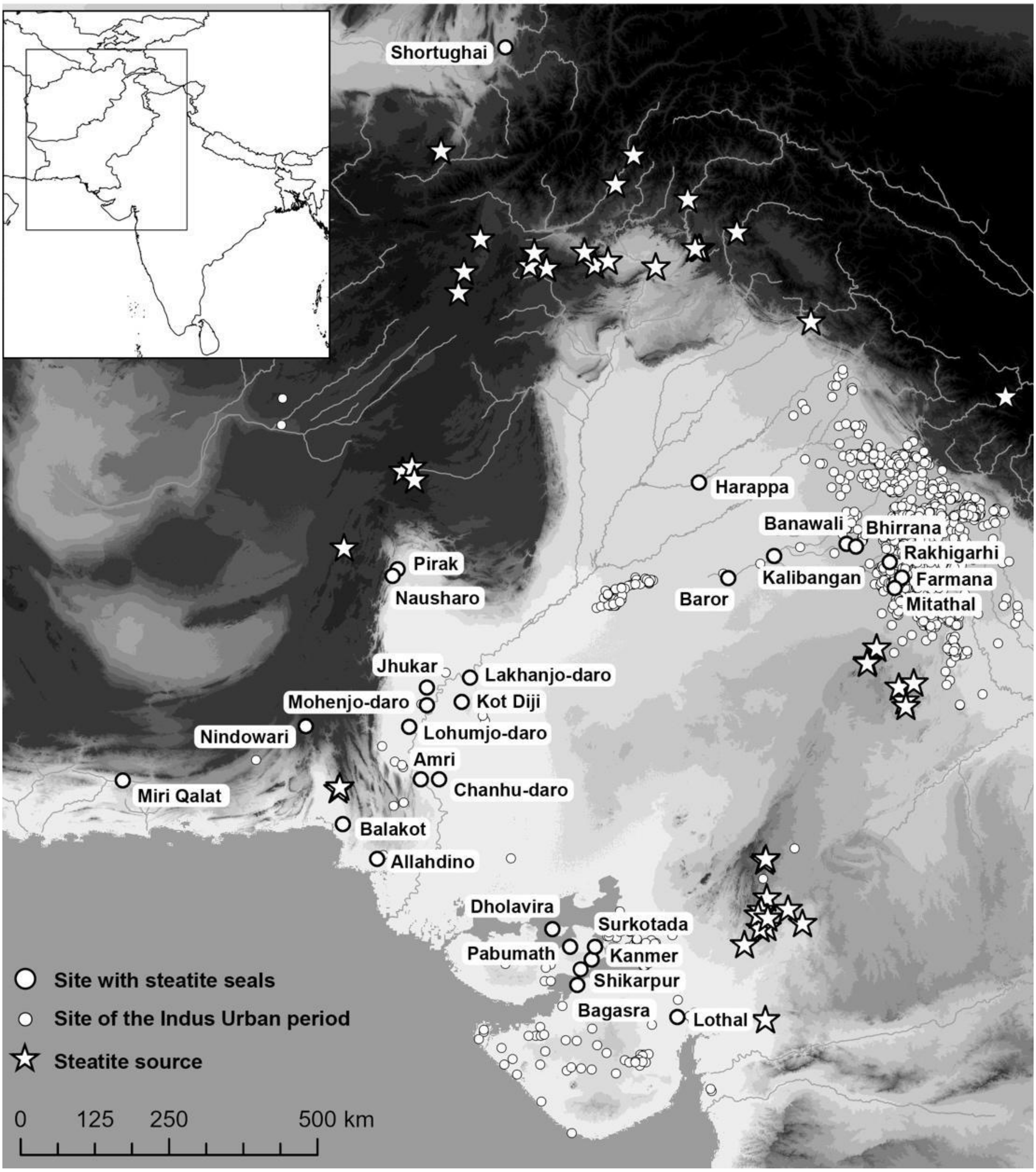


Fig. 1: Map of Major Indus Tradition Sites

production was organized and varied over the longue durée of the Indus Tradition. By focusing more specifically on patterned variation, we provide new insights into why seal production varied and changed over time, and what this can tell us about the organization and integration of Indus people over thousands of years.

We argue that similarities and standardization in certain aspects of Indus seals, some of which have considerable time depth, represent shared sociotechnical systems that were crucial to integrating Indus people. On the other hand, we link patterned variation with diachronic changes and the unique carving methods of the artisans who produced them. Overall, we infer that seal production during the entire Indus Tradition was dynamic and decentralized. In the absence of deciphered written records, multifaceted studies of material culture, especially important administrative objects like seals, are necessary to investigate larger aspects of interrelated social, economic, political, and ideological systems in the Indus region.

Background

To study Indus seals, it is necessary to understand the chronology and cultural developments that were responsible for their creation and use. The Indus Tradition (Table 1) is one of the chronological frameworks used to document the history of cultural adaptations in the region where the Harappan civilization flourished (Kenoyer 1992, 1998, 2000, 2008; Shaffer 1982, 1992). It is composed of five major Eras and associated Phases, spanning a period of approximately 9000 years. These are useful heuristic tools for identifying and understanding the processes of local cultural developments that were responsible for the emergence, florescence, and eventual decline and transformation of the Indus Civilization. Crucial to these processes were the development and widespread use of numerous crafts, including important administrative objects like seals. The Indus Tradition also takes these into account and is therefore the primary chronological framework used in our research.

While the sophisticated urbanism that characterizes the Indus Civilization reached its apex during the Integration Era of the Harappa Phase (2600-1900 BCE), coincident with the Mature Harappan Period used in other chronological frameworks (e.g. Possehl 2002), the processes responsible for them have their antecedents during the earlier Early Food-Producing and Regionalization Eras. It is important to understand the developments that occurred during these periods that led to the emergence of the Indus civilization and its unique craft traditions, especially seal production. Current evidence suggests that seal production began well before the Integration Era, during the second half of the Regionalization Era (after 4000 BCE). This, in addition to the distinctiveness of the earliest seals, supports the assertion that their development was a local phenomenon as opposed to diffusion from the west. In this paper, we use this framework interchangeably with more colloquial terms including Pre-Urban, Urban, and Post-Urban periods.

Seals are not unique to the Indus; in fact, they were used widely across the Mediterranean, West, Central, and South Asia for thousands of years from the Fourth Millennium BCE onwards. Once described as "devices to make honesty unnecessary" (Collon 1997:7), their widespread adoption and use is ultimately associated with administrative behaviors. The study of seals provides important insights into many aspects of ancient cultures and has been the

Era	Phases	Time Period
Foraging Era	Mesolithic & Microlithic	10,000-2000 BCE
Early Food Producing Era	Mehrgarh	7000-5500 BCE
Regionalization Era	Early Harappan Phases: Ravi, Hakra, Balakot, Amri, Sheri Khan Tarakai, Kot Diji, Sothi	5500-2600 BCE
Integration Era	Harappan Phase: Harappa Site Period 3A Harappa Site Period 3B Harappa Site Period 3C	2600-1900 BCE 2600-2450 BCE 2450-2200 BCE 2200-1900 BCE
Localization Era	Late Harappan Phases: Punjab, Jhukar, Rangpur	1900-1300 BCE

Table 1: General Chronology of the Indus Tradition (after Kenoyer 2008)

focus of numerous studies in and beyond the Indus for a long time. Recent scholarship on seals includes cross-cultural approaches to production, use, iconography, ideology, exchange, and other issues, giving new insights into the significant and varied roles they played throughout the ancient world (Ameri et al. 2018).

In South Asia, seals played a crucial role in identifying the unique character of the Indus Civilization in at least three ways. First, their discovery at Harappa and Mohenjo-daro helped establish the Indus as an ancient literate civilization. Second, early investigations demonstrated that Indus seals and the writing often engraved on them are distinct from similar materials found elsewhere, helping to establish the Indus as an indigenous ancient South Asian civilization. Finally, the discovery of seals at sites throughout the north-western part of the subcontinent, the Gulf, Central, and West Asia have helped define the extensive geographical extent and long-distance exchange networks that make it well-known and distinctive among the world's earliest civilizations.

Since seals have been central to Indus scholarship since its inception and are still used to identify the Harappan presence at a site, they have been the focus of many previous studies. Despite their prominence and diagnostic character, Indus seals are diverse. Throughout the Indus Tradition, they were fashioned from different raw materials, in different shapes, and served different functions (Figure 2). Because many are inscribed with the Indus script, they are often conflated with related inscribed materials such as tablets, sealings, and seal impressions. We (Jamison et al. 2023; Uesugi et al. 2023) define Indus seals and distinguish them from other objects as follows:

1. Indus seals are engraved intaglio with distinct iconography, inscriptions, or both
2. Indus seals contain a holding device or are perforated to allow for suspension

Our research focuses primarily on objects that meet these criteria, leaving to others more detailed studies of Indus writing (Fuls 2023; Kenoyer 2006, 2020; Parpola 1994; Rao 2018; Rao et al. 2009; Wells 2015; Yadav et al. 2009; Yadav and Vahia 2013) tablets (Kenoyer 1998, 2005, 2021; Kenoyer and Meadow 2010), and sealings and seal impressions (Frenez 2005, 2018, 2020). Besides being diagnostic artifacts of the Integration Era (and Indus Tradition more broadly), seals represent some of the finest examples of Indus technical virtuosity, mobiliary art, narrative and ideology (Ameri 2018), and administrative behaviors. Indus seals have been the focus of many previous studies, including some of our own (Ameri and Jamison 2022; Jamison 2011, 2013, 2016, 2017, 2018a, 2018b, 2020; Jamison et al. 2017, 2023; Uesugi 2011; Uesugi et al. 2016, 2023). Here we attempt to build on earlier research by examining a much greater quantity and variety of seals.

Methods

We employ multiple, complementary approaches to the study of seals of the Indus Tradition. While analyzing actual seals is preferable, and we have been fortunate to have done so over the past fifteen years, a significant portion of our research has taken place using published images, especially the five volumes of the Corpus of Indus Seals and Inscriptions (CISI), compiled and edited by Professor Asko Parpola and colleagues over the past several decades (Joshi and Parpola 1987; Parpola et al. 2010; Parpola et al. 2019; Parpola and Koskikallio 2022; Shah and Parpola 1991). Other publications have been useful to help evaluate and, in some cases, refine typologies and chronologies.

In fact, a significant portion of our research has focused specifically on classification, which includes typological and chronological attributes. Well-defined seal typologies exist and have been used since the early excavations at Mohenjo-daro and Harappa (Mackay 1938; Marshall 1931; Vats 1940), and for the most part, we use them, with occasional modifications and additions. Regarding chronology, existing chronological frameworks, especially the Indus Tradition as discussed above, are of crucial importance to our classificatory analysis. Unfortunately, there are few stratigraphically informed archaeological seal chronologies for the Indus Tradition, with one notable exception. This is the seal chronology developed by the Harappa Archaeological Research Project (Kenoyer and Meadow 2010), which we rely on in our analyses of seals from the Harappa Phase of the Integration Era (Table 3). When possible, we also utilize regional and site-based chronological frameworks to further contextualize seals from different regions and phases within the broader Indus Tradition.

We have also, in earlier studies (Jamison 2011, 2013, 2017) conducted experimental and ethnoarchaeological replication studies of Indus seals, which collectively have provided insights into potential sources of variation associated with aspects of production. Formal stylistic, metric, and technical analyses have also been undertaken in our earlier work to further explore variation in Indus seals, and identify patterns associated with production and distribution. Most recently, we have applied statistical analyses to a large collection of published unicorn seals

to identify broad patterns in the ways in which they were carved that we link with diachronic changes (Jamison et al. 2023).

Our long-term research on various aspects of Indus seals has resulted in the creation of a substantial database, managed using FileMaker Pro software. At present, it contains nearly 2,700 seals from over 50 sites, representing all major periods during which seals were made and used during the Indus Tradition. It is a crucial tool for the management and analysis of nearly 2,000 years of seals in the Indus, a major goal of this study.

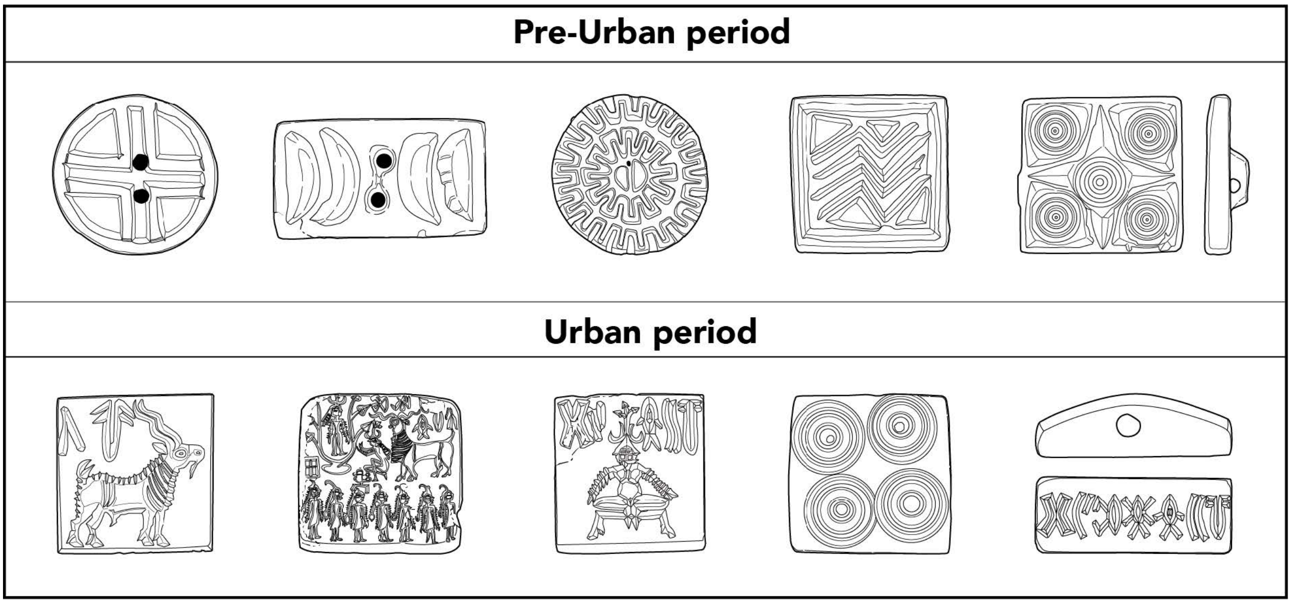


Fig. 2: Seals of the Indus Tradition

Current Perspectives on Seals of the Indus Tradition

One of the clearest sources of variation in seals during the Indus Tradition is diachronic. Seals were made and used for a long time, by people living in different places. It is not terribly surprising that raw materials, morphology, production techniques, and iconography vary across time and space. This represents variation on a broad scale, and it is useful to further examine patterns and variations by period. There is also evidence of regional (and in some cases site-based) variation throughout all periods that seals were made and used during the Indus Tradition, which can be interpreted representing variability on an intermediate scale. On a small scale, it is possible to identify sources of variation associated with the production methods and carving techniques of the artisans who made seals, particularly during the Integration Era (2600-1900 BCE) or Urban Phase of the Indus Civilization. This multi-scalar approach to investigate continuities and variation is used to describe seals in each period they were made and used.

Seals of the Regionalization Era/Pre-Urban Period (ca. 3500-2600 BCE)

To date, only a small number of seals (144) from nine sites have been assigned to this period, dating roughly from 3500-2600 BCE (Uesugi et al. 2023). All the sites are in the northern part

of the Indus culture area, and temporal affiliations are primarily based on associations with ceramics, though there are a few known from stratigraphically controlled excavations. Even in the earliest phase of seal production and use in the Indus Tradition, there is clear evidence of variation. For example, though steatite was the predominant raw material, there are examples of terracotta, ivory/bone, non-ferrous metal (likely copper or bronze), shell, unidentified stones, and other materials. They also vary widely by morphology; twelve distinct types have been identified (Table 2)

Differences in raw materials and morphology represent variation associated with production, further evidence of which is seen by two basic types of perforation among the seals from the Pre-Urban Period (Uesugi et al. 2023). Furthermore, the corpus also demonstrates significant evidence of variation in iconography, with a wide variety of types identified (Figure 3), including geometric and zoomorphic motifs. Some of these are present among seals of the Urban Period, representing continuities, but others are not. Several motifs represented during the Pre-Urban Period are not attested on seals of the Urban Period (2600-1900 BCE), and this represents broad-scale variation over time.

Of equal significance is evidence of regional diversity among the seals of the Pre-Urban Period. This represents variation on an intermediate scale and is characterized by patterned differences in raw materials, morphology, iconography, and connections with materials from other regions. What we describe as the northern group includes materials from sites in the Bannu, Gomal, Punjab, and the Ghaggar regions, dominated by steatite, a greater range of iconographic motifs, and a limited number of morphological types. In contrast, seals of the southern group include materials from Baluchistan that are primarily made from terracotta,

	n=	Steatite	Other stones	Terracotta	Copper/ bronze	Ivory/ bone	Shell	Bitumen
Kunal	15	9		2		1	3	
Baror	6	6						
Harappa	5	4				1		
Gumla	1	1						
Rehman Dheri	46	44	1			1		
Tarakai Qila	4	4						
Mehragrh	49	1	1	38		7	1	1
Mundigak	17		13		4			
Shahi Tump	1				1			
n=	144	69	15	40	5	10	4	1

	n=	Square	Circular	Rectangular	Triangular	Hexagonal	Rounded square	Concave square	Floral	Crisscross	Denticulated circular	Denticulated rectangular	Denticulated triangular	Animal-shaped	Others	Unidentified
Kunal	15	9	5						1							
Baror	6								2							2
Harappa	5	5														
Gumla	1	1														
Rehman Dheri	46	9	2		2		1	1	18				2	2		6
Tarakai Qila	4	1	1					1	1							
Mehragrh	49	6	19	13		1		3	2	2	3					
Mundigak	17	2	2	2						2	1	1	1		4	2
Shahi Tump	1		1													
n=	144	33	30	15	2	1	1	5	24	4	9	1	3	2	4	10

Table 2: Distribution of Pre-Urban Period Seals by Site, Raw Materials, and Morphology

demonstrate more morphological diversity, and a narrower range of iconographic motifs (Figure 3). There are examples of northern group seals among the southern group, and vice versa, which demonstrates integration and exchange that is also attested with other forms of material culture, including ornaments and ceramics.

It has not been possible to systematically examine variation among the corpus on a small scale yet, but this work is underway. Regardless, the discovery of patterned variation among the seals of the Pre-Urban period is significant for multiple reasons. First, it suggests that variable production strategies were characteristics of seal production in the Indus Tradition from its outset, a trend that continues in later periods. Second, though regionally distinct patterns of seal production are present, there is also evidence of integration and exchange, a hallmark of the Indus Civilization during the Integration Era. Finally, the northern group, with its preference for steatite as a raw material and use of animal iconography, bears strong similarities with the most common type of seal from the Urban Phase, demonstrating continuities over time and space.

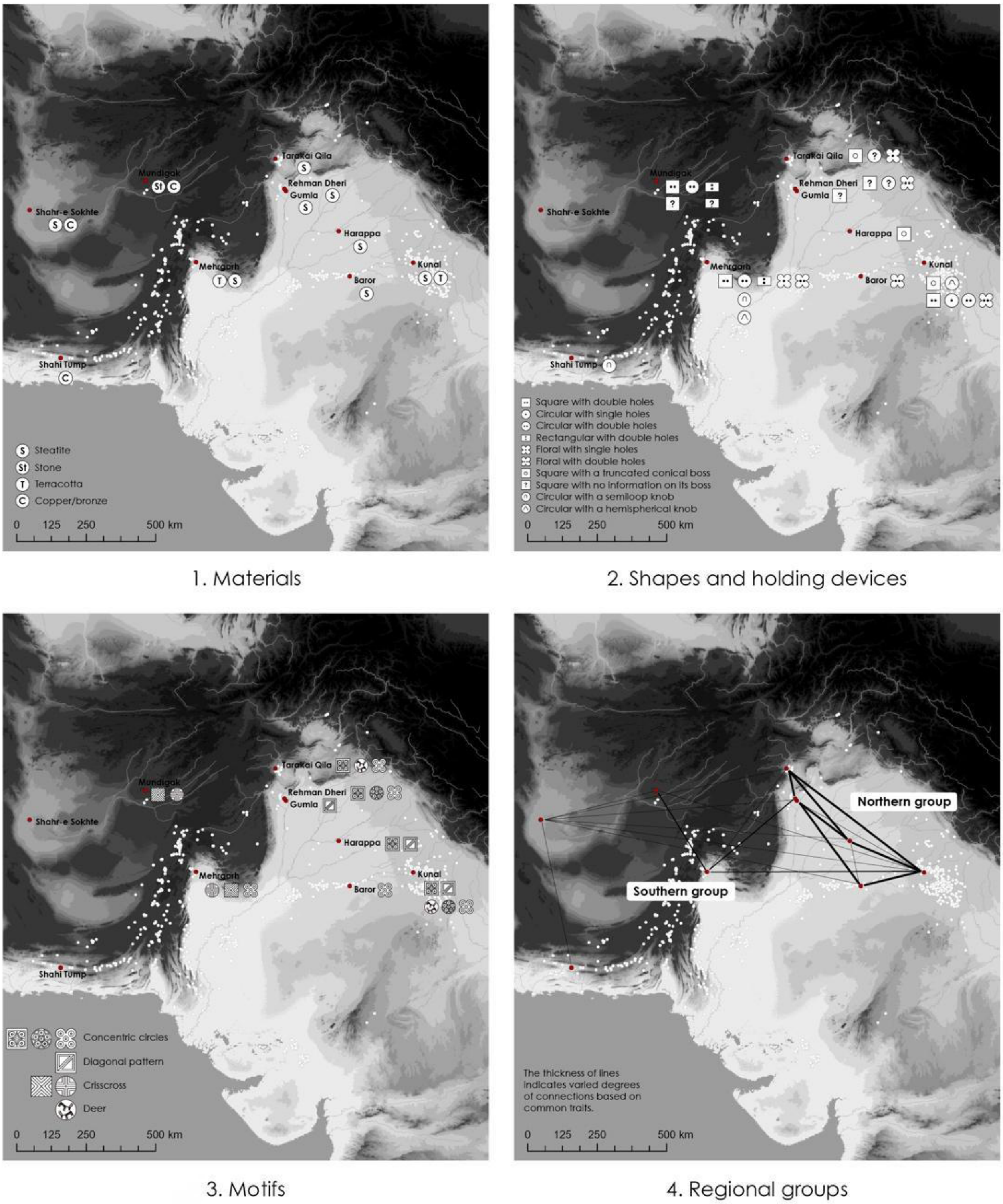


Fig. 3: Distribution of Seals from the Pre-Urban Period by Site, Material, Morphology, Motifs, and Regional Groups

Seals of the Integration Era/Urban Period (2600-1900 BCE)

During this period, the Indus Civilization flourished, and seal production reached its peak. Our database contains over 2,400 seals assigned to this period, from 42 different sites. This is a significantly larger number than either of the other two periods, and collectively, the assemblage demonstrates significantly greater variation. Because of the large number of seals, and our extensive analyses of materials from this period, we have identified multiple sources of variation summarized here as follows:

1. Morphology and Iconography
2. Production and Operational Sequences
3. Diachronic Variation
4. Carving Styles

Most seals of the Integration Era were made of fired steatite, are square in shape, and are often engraved with a short inscription and animal motif, but not all of them are. There are many rectangular seals, a few circular ones, and exceptionally rare examples of cylinders. Iconography is even more variable. There are dozens of motifs represented, including a wide variety of zoomorphic, anthropomorphic, composite, geometric, abstract, and narrative motifs (Figure 4). Many of these do not have antecedents in the Pre-Urban period and disappear at the end of the Urban Period, representing an important but marginalized source of broad diachronic variation during the Indus Tradition. The distribution of seals with different animal iconography varies considerably by site and region too, providing insights into variation at an intermediate scale further discussed below. (Figure 4)

Different animals are carved in different ways for a variety of reasons, some of which are obvious. A tiger is anatomically distinct from a zebu bull, elephant, or unicorn, and Indus seal carvers were intelligent and proficient enough to depict these differences when carving animals. During the Integration Era, different animals were also distinguished by the ways in which they were decorated, often associated with anatomical and naturalistic representations. However, there is evidence of small-scale variation in the ways in which the same animals were carved on different seals, further explored below. Geometric seals from the Urban Period are also worthy of further investigations because of their prominence, variation, and significance for understanding long-term continuities and changes from the Pre- and Post-Urban Periods (Uesugi et al. 2023). More broadly, iconography is a significant source of variation in seals of the Integration Era/Urban Phase.

Evidence of variation in production is more challenging to investigate and best understood as reflecting variation on a small scale. We identify variation in production at four levels: raw materials, tools, firing, and operational sequences. Though steatite was the primary raw material used to craft seals during the Integration Era, it was by no means the only one. There are seals made of terracotta, non-ferrous metals (copper and silver), faience, and other unidentified materials (Figure 4). We know that Indus people used a variety of steatite sources (Law 2011), none of which are located near the major settlements of the Integration Era. But seals and other objects were made of steatite that came in different colors, textures, and qualities. This is

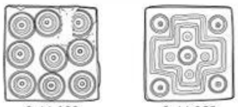
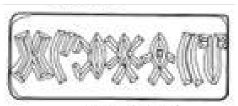
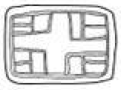
	Material	Shape	Design/iconography	Examples
Urbanperiod	Steatite	Square	Zoomorph	1. M-631 2. FRN-1 3. M-2135
			Anthropomorph	4. M-1181
			Composite	5. M-1186 6. M-304 7. B-39
			Geometric	 8. M-128 9. M-352
		Circular	Zoomorph	10. M-417
		Rectangular	Inscription	 11. H-1705
	Terracotta	Square	Zoomorph	12. K-3
			Geometric	13. H-105 14. H-120
		Circular	Geometric	15. Kd-6
	Silver	Square	Zoomorph	16. M-317
	Faience	Rectangular	Geometric	 17. KMR-3
		Geometric	Geometric	18. H-1073

Fig. 4: Classification of Seals of the Urban Period

observed in comparative analyses of unfinished/damaged seals and unmodified steatite debitage at multiple sites.

The tools used in seal manufacture during the Integration Era are not fully understood due to the lack of stratigraphically excavated workshops that provide associations between seals and the implements used to make them. However, there are numerous published examples of tools that could have been used to make seals, including objects with different tips and edges made of copper, bronze, bone, shell, and stone. Some of our earlier work (Jamison 2013, 2017) focusing on experimental and ethnoarchaeological replication of Indus unicorn seals has demonstrated that different tips and edges are more effective for specific carving tasks. These and other studies also demonstrate that tools fashioned from different raw materials create distinct cut marks which can be distinguished microscopically (Jamison 2013, 2017; Kenoyer 2003, 2006; Uesugi et al. 2016; Uesugi and Jamison 2022). Not all seals made during the Urban Period were made with the same tools, and replicative studies are useful to develop interpretive models that can be tested against archaeological data in future studies.

Investigations of operational sequences involved in square stamp seal production during the Integration Era also reveal evidence of variation on a small scale. Earlier and recent studies (Green 2016, 2018; Jamison 2013, 2017; Kenoyer 1998, 2009; Konasukawa 2013; Mackay 1938, 1943; Marshall 1931; Rao 1985; Vats 1940) have demonstrated that there is no standardization or consistency in operational sequences. This is best observed by comparing unfinished seals, wherein sometimes the iconography (usually an animal) was carved first, and in others the inscription took precedence (Figure 5). It is unclear why operational sequences were variable, but our ethnoarchaeological research suggests that it is at least in part due to the fact that different artisans carve seals differently.

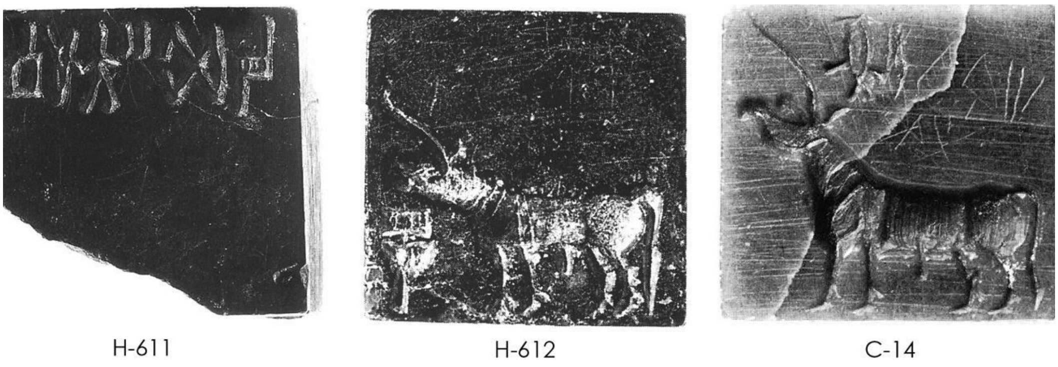


Fig. 5: Seals Showing Different Operational Sequences (Joshi and Parpola 1987; Shah and Parpola 1991). H=Harappa, C=Chanhu-daro

One of the most significant yet poorly understood aspects of Indus steatite seal production is pyrotechnology. Nearly all Indus steatite seals were fired, which appears to have served two purposes: hardening the stone and lightening its color (Law 2011). Our understanding of the processes involved is limited because it has not been systematically investigated and published recently, though earlier research suggests that some steatite will harden and lighten at high temperatures without surface treatment, and other sources will not (Jamison 2017). The

implications are that raw materials and firing are potential sources of variation in production and may be distinguished by comparing the sections of broken seals. An example from the site of Bagasra (Figure 6) highlights this well. Both seals have lightened exterior surfaces, but the interior surfaces are distinct. This demonstrates quite clearly that not all seals were fired and lightened in the same ways and provides opportunities for future research.

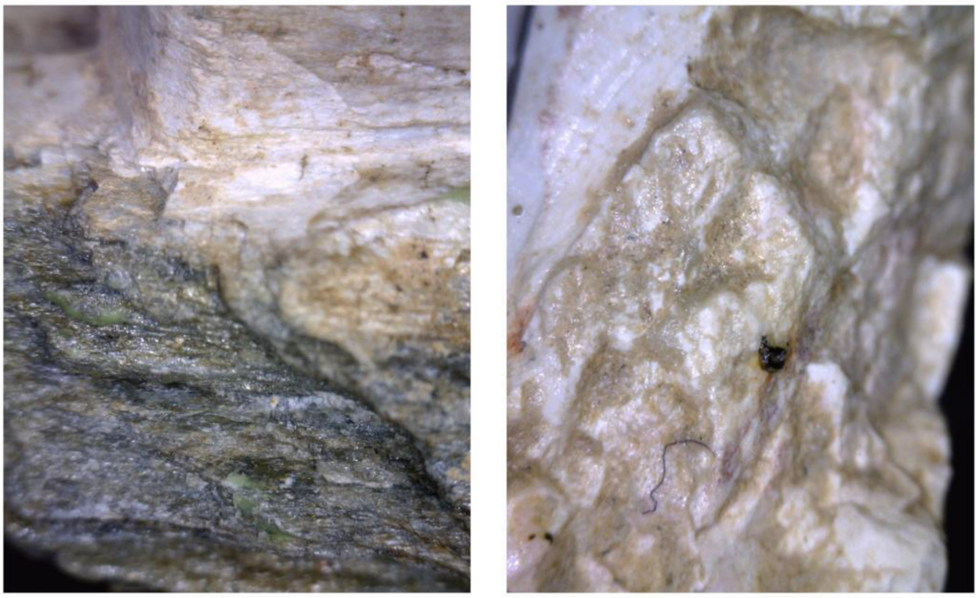


Fig. 6: Variation in Fired Steatite Seals Seen in Broken Sections (Courtesy Department of Archaeology and Ancient History, MS University of Baroda)

To further investigate and appreciate the scale and nature of variation in seals from the Integration Era, it is necessary to examine their temporal and spatial distributions. This provides insights into diachronic patterns within the Urban Period and helps understand continuities and changes with the periods that precede and follow it.

Earlier studies (Ameri 2013; Jamison 2017, 2019; Kenoyer 2006; Kenoyer and Meadow 2010; Konasukawa 2013; Konasukawa and Koiso 2018; Uesugi et al. 2016) have investigated diachronic variation in seals carved with animals and inscriptions during the Urban period. Here, we reiterate that some variation can be correlated with changes in the carving styles of seals throughout the Integration Era/Urban Period. This variation is summarized as follows:

1. Chronological changes in the orientation and carving styles of animals and inscriptions.
2. Chronological changes in the production methods of perforated knobs (bosses) on the rear faces of the seals.

It has been possible to develop a seal chronology thanks to the stratigraphically controlled excavations at Harappa by the Harappa Archaeological Research Project (Kenoyer 2006; Kenoyer and Meadow 2010). Chronological changes include the transition from right to left facing animals on seals, a shift from bold, angular carving styles to more smooth, naturalized ones, and chronological changes in the carving styles and orientations of the inscriptions themselves (Table 3).

Period	Chronology	Iconographic Carving Style	Inscription Carving Style	Inscription Orientation
3A	2600-2450 BCE	Angular, Bold	Angular	Linear
3B	2450-2200 BCE	Round, Natural	Curved	Irregular
3C	2200-1900 BCE	Round, Natural	Bold, Rigid	Linear

Table 3: HARP Seal Chronology (after Kenoyer 2006)

Using this as a comparative tool, we have further refined this framework (Jamison 2017; Uesugi and Jamison 2022; Uesugi et al. 2023) to create a tentative chronology of changing unicorn styles (Figure 7) that can be tested against archaeological data as more stratigraphically rigorous excavations are conducted throughout the Indus, and new seals are published. This work has been supplemented by investigations of chronological changes in other aspects of production methods, particularly the carved, usually perforated knobs (bosses) on the rear faces of square stamp seals from the Urban period. These studies (Konasukawa 2013; Konasuka. wa and Koiso 2018; Uesugi et al. 2023) have demonstrated that the morphology and production technologies involved in creating these features, thought to have served (at least in part) as suspension devices, also changed through time.

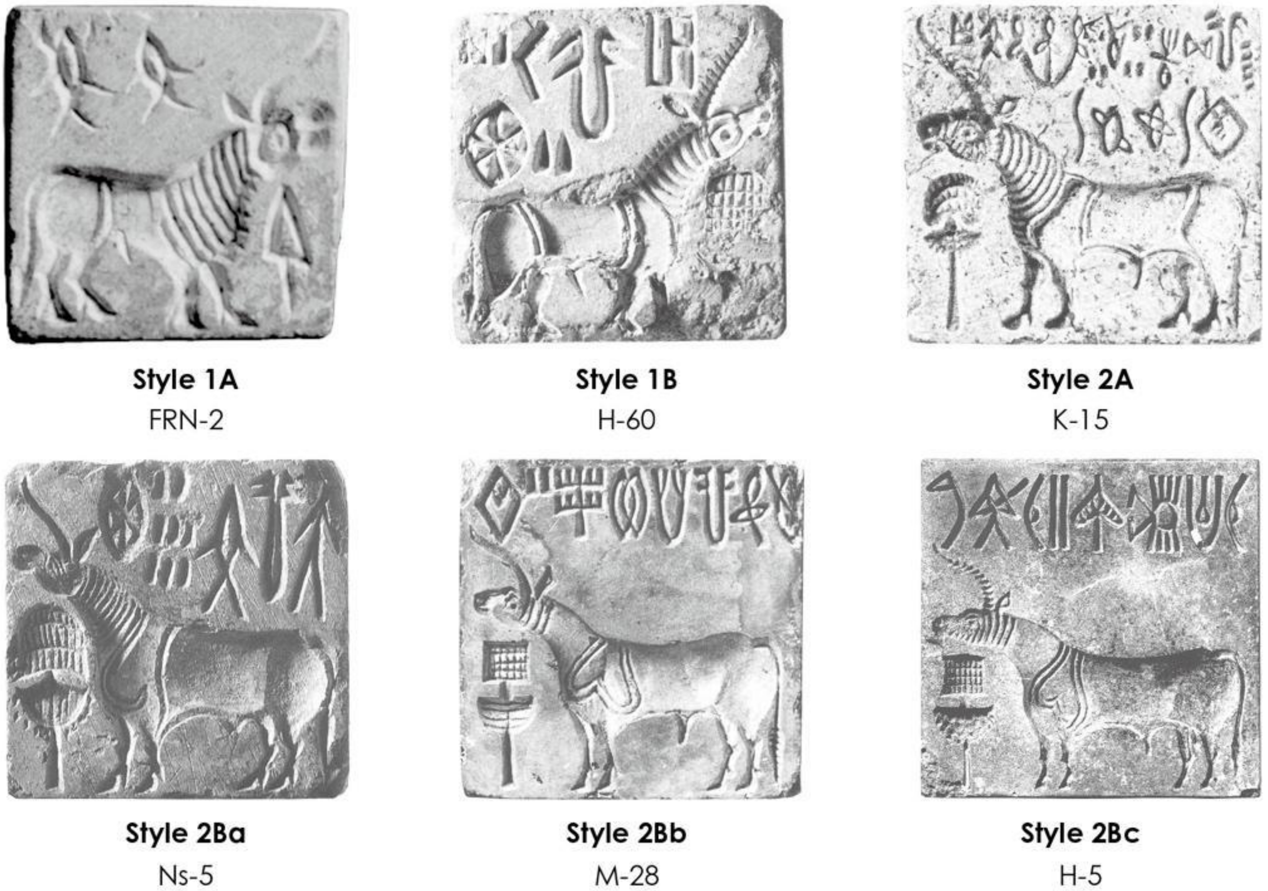


Fig. 7: Different Styles of Unicorn Seals

Examining spatial variation in seals from the Integration Era is best done by mapping the distribution of those with different iconography. Building on earlier research (Kenoyer 1998; Possehl 2002), we have identified significant differences in the distribution of animal motifs by site and region (Figure 8). The unicorn dominates, not surprising since it is the most common throughout the corpus of published Indus seals. What is more interesting is the limited distribution of other animals and variation and their distribution patterns. Earlier studies (Ameri 2018; Frenez 2018; Frenez and Vidale 2012; Kenoyer 1998; Parpola 1994; Uesugi et al. 2023; Vidale 2005) have already discussed this and correlated it with different social, economic, and political groups that used seals, along with regional and perhaps ideological differences. Our contribution here is to graphically represent this variation and suggest that further research should be undertaken to see if there are patterns associated with other kinds of material culture.

Our most extensive work to date has focused on unicorn seal carving styles, representing variability on a small scale. Unicorns have been the primary motif because they are the most abundant, and therefore provide the most robust data set for analyses. Earlier studies have demonstrated that over 70% of published square seals with animal iconography depict unicorns (Kenoyer 1998; Parpola 1994). It is a uniquely Indus form of animal iconography, represented as a single-horned bovid shown in profile. The single horn distinguishes it from other animals, and despite uncertainties about its origins and meaning (Kenoyer 2009, 2013; Parpola 1994, 2011), its frequency on seals demonstrates that it was important during the Urban period. The unicorn is represented in other mediums such as terracotta figurines and painted ceramics, and the presence of other two-horned animals (zebu bulls, Indian bison, and water buffalos, for example) further demonstrate that it was distinct from other animals and was intentionally depicted as such (Kenoyer 2013). Anyone who has studied and compared Indus seal iconography can easily distinguish the unicorn from all other animal forms and types.

Unicorns are further distinguished from other animals by their body plans, morphologies, proportions, and other common compositional elements. Generally, unicorns have slender, upturned heads, and some have prominent snouts and lower jaws. Eyes and ears are also standard anatomical features, as are long, narrow necks. They tend to have slender legs with prominent hooves and pizzles and long, curvilinear tails. Other unique features of unicorn iconography are distinctive patterns of engraved decorations on their heads, necks, and front flank of the animal's body (known as halter, blanket, or withers). The objects below their heads, which we call the standard, is another important aspect of unicorn iconography. Collectively, all of these elements help define a unicorn.

Unicorn seals are diagnostic of the Indus, and as much as most of them depict the features discussed above, along with short inscriptions and carved bosses on their rear faces, they are somewhat standardized. However, detailed comparative analyses over the past thirty years have revealed considerable variation in the ways in which unicorns were carved and decorated (Franke-Vogt 1992; Green 2018; Jamison 2017; Kenoyer 2009, 2013; Rissman 1989). As discussed above, there is evidence that unicorn seal carving styles and techniques changed over

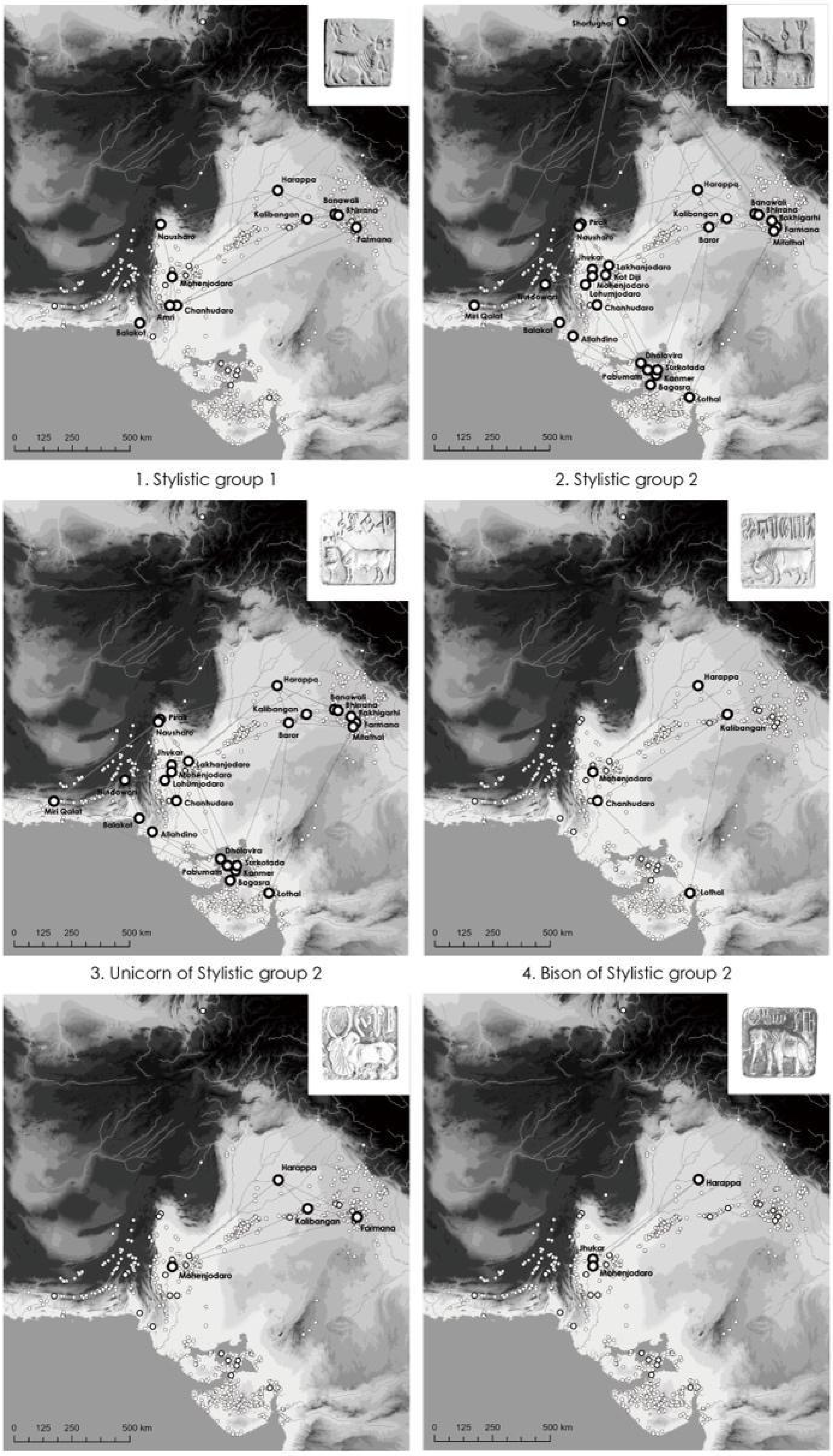


Fig. 8: Distribution of Seals with Different Iconography

time during the 700 years they were used during the Urban period (Jamison 2017; Kenoyer 2006; Kenoyer and Meadow 2010).

Most of our work on seals from the Urban period has focused on identifying patterned variation that reflects the idiosyncratic carving styles, techniques, and skills of the artisans that made them. Much of this has been discussed elsewhere (Jamison 2013, 2017, 2018a, 2018b, 2019; Jamison et al. 2017; Uesugi and Jamison 2022; Uesugi et al. 2016; Uesugi et al. 2023), so here we provide a brief summary of our findings. Using methods of formal stylistic and metric analyses developed from ethnoarchaeological studies of replicating production methods (Jamison 2013, 2017), it has been possible to identify groups of unicorn seals that represent the products of different artisans and workshops (Figure 9). Group membership was determined based on shared carving styles and proportions of compositional elements of the unicorn and standard (Figure 10).

These unicorn seal groups generally consist of less than five members. Subsequent studies on seals with other animal motifs have revealed similar results, showing complex and varied distribution patterns. Some groups are confined to single sites, others include members from multiple sites, and a few exhibit multi-regional or even interregional distribution patterns (Figure 11). Using the Harappa seal chronology, we have identified groups associated with all three periods of the Harappa Phase, and also note that the number of stylistic groups increases over time (Table 4). Overall, research on idiosyncratic variation in seal carving styles and techniques has highlighted evidence of patterned variation at a small scale that likely reflects the skills and unique choices of the artisans who made them. More broadly, it has provided important insights into how production was organized and varied throughout the Urban Period.

Period	Number of groups	Total number of seals
3 A (2600 - 2450 BCE)	3	8
3A/ 3B Transitional	3	8
3B (2450 - 2200 BCE)	18	59
3C (2200 - 1900 BC)	31	105

Table 4: Distribution of Unicorn Seal Groups by Period of the Harappa Phase

Though seal production and use were likely regulated and controlled by elites (Kenoyer 2000, 2006, 2014) on a local scale, the discovery of multiple stylistic seal groups, widely distributed within and among different sites, and comprised of seals with different animals and inscriptions, suggests a decentralized form of production throughout the Indus Civilization as a whole (Jamison 2017). Since seals were used by ruling elites as symbols of wealth and power (Kenoyer 2000, 2006), a decentralized form of production suggests similar forms of

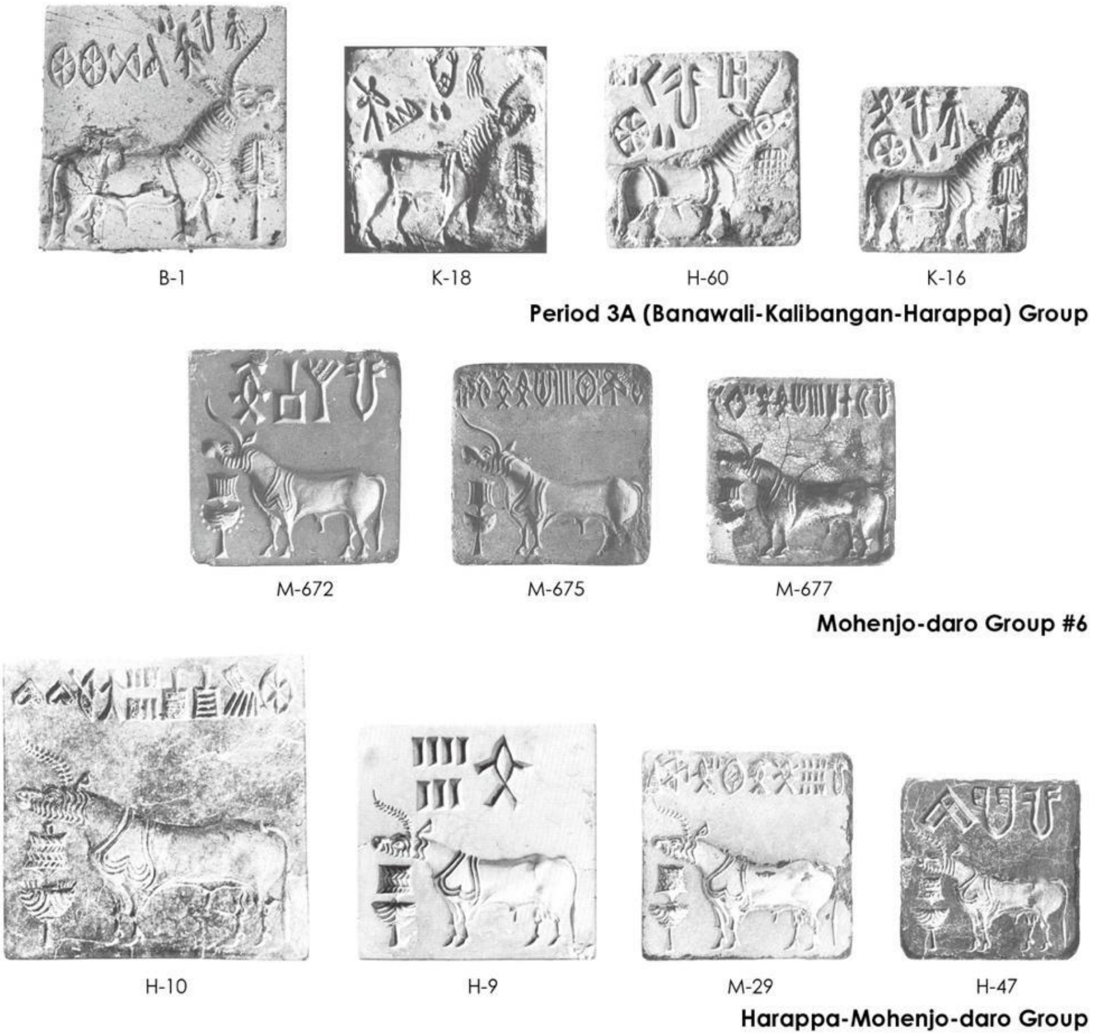


Fig. 9: Stylistic Unicorn Seal Groups (after Joshi and Parpola 1987; Shah and Parpola 1991). B=Banawali, H=Harappa, K=Kalibangan, M=Mohenjo-daro

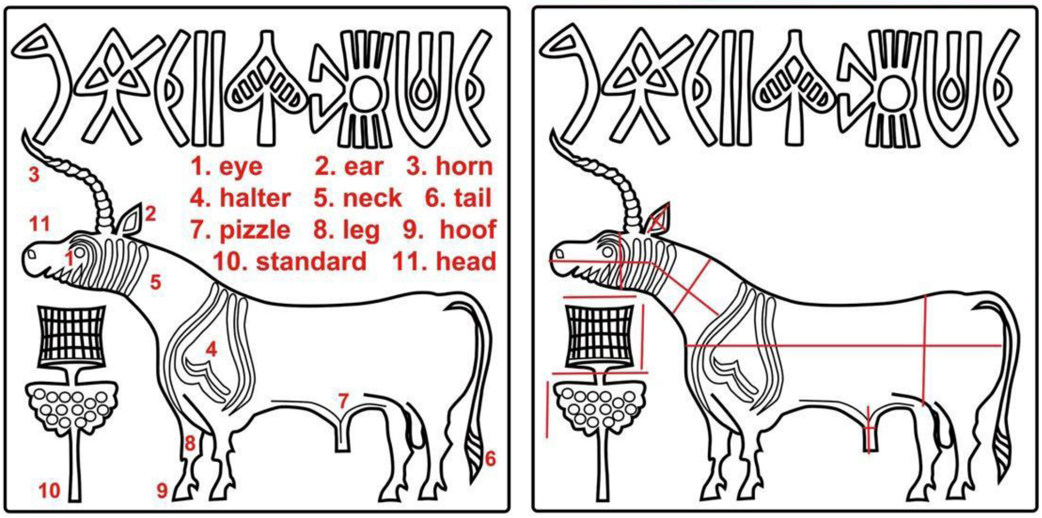


Fig. 10: Attributes and Measurements used to Identify Stylistic Groups

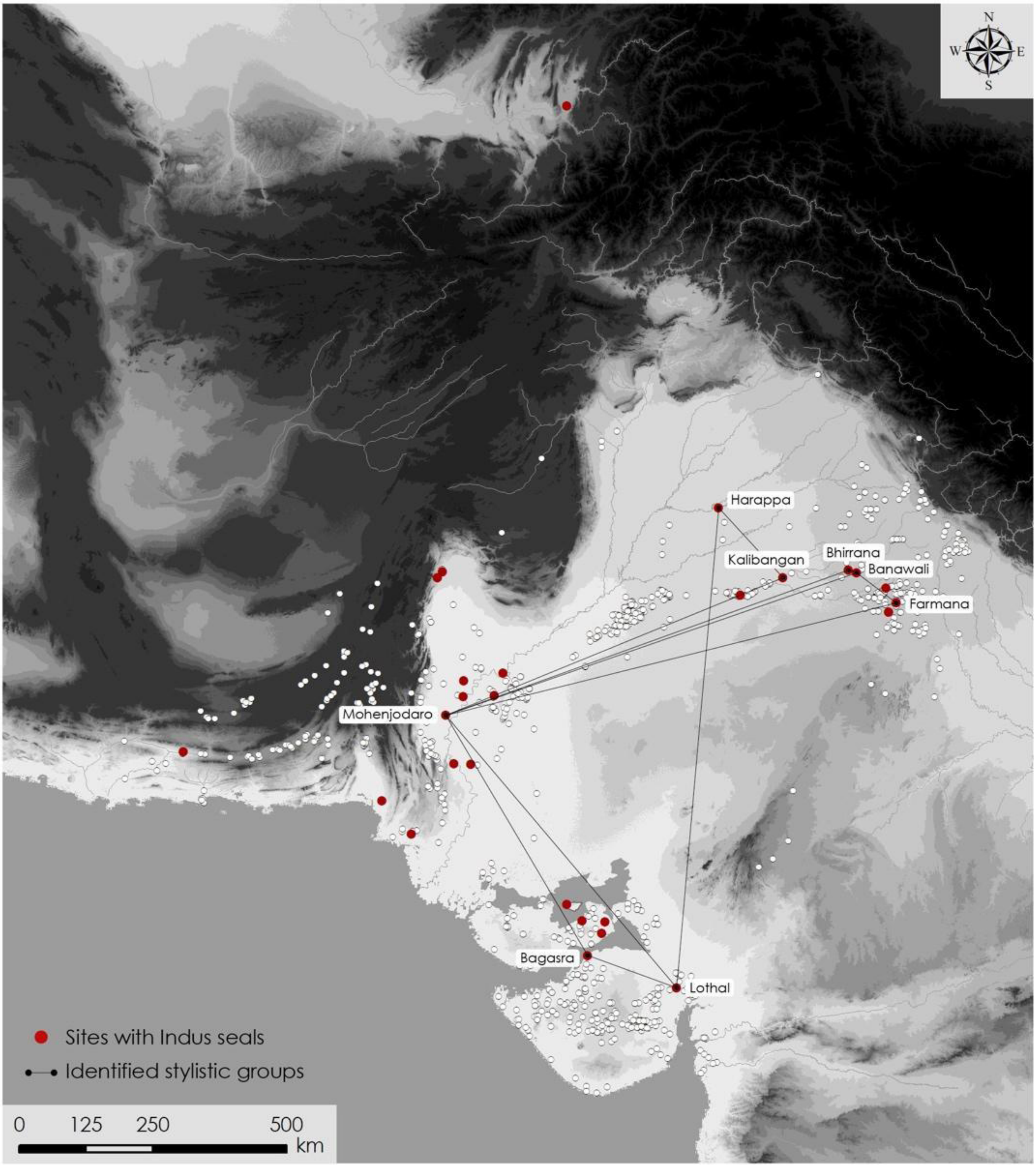


Fig. 11: Inter-site Distributions of Unicorn Seal Groups

sociopolitical organization and control, supporting current interpretations and highlighting the distinctive character of the Indus among the world's earliest and most unique urban societies and civilizations.

Seals of the Localization Era/Post-Urban Period (1900-1500 BCE)

Only 52 seals from four sites (Pirak, Chanhu-daro, Jukhar, and Amri) have been assigned to this period (Uesugi et al. 2023), all from the southern half of the Indus Valley. The majority are made of terracotta and are circular in shape, representing a significant change from the earlier two periods. A variety of motifs are represented (Figure 12), but none contain the animal motifs and inscriptions that were so common during the Integration Era. Because of the small size of the assemblage and lack of detailed studies, it is difficult to make robust interpretations about seals of the Localization Era. However, a few observations and suggestions for future studies are worth consideration here.

The first of these is that seals from the Localization Era/Post-Urban Period demonstrate long-term continuities dating all the way back to the Regionalization Era/Pre-Urban Period. These are best seen in iconography, specifically certain geometric motifs that are attested in the Pre- and Urban Periods. Such continuities support the inference that cultural developments and traditions in the region were undertaken by local people, who made and used distinctive objects and symbols for thousands of years. Secondly, there are more similarities in seals of the Pre- and Post-Urban periods, represented by morphology, raw materials, and iconography, and it is interesting that they exist given their separation in time and space. Regarding the latter, the limited distribution of seals during the Localization Era is also significant. The absence of seals from the northern part of the Indus Valley, Ghaggar region, and Gujarat in the Post-Urban Period is surprising, given the prominence of seals from these regions during the Urban Period, and the fact that all regions were occupied during the Post-Urban Period. Finally, the disappearance of seals with animal iconography and Indus writing, long noted by scholars, provides some of the strongest and clearest evidence for the decline and transformation of the Indus Civilization.

It can be summarized that seals from the Localization Era/Post-Urban period include elements derived from various sources, including geometric motifs of the Pre-Urban and Urban periods, along with some features unique to this period (Figure 12). The emergence of Post-Urban seals needs to be examined in connection with the decline of urban centers and re-emergence of regionally distinct styles of other material culture. It appears that significant changes took place in the social structure including population flow, exploitation of raw materials and interregional connections along with the decline of urban centers and urban society, but the persistence of the use of seals, even on a diminishing scale, is one of the important clues to better understand the social transformation from the Urban to Post-Urban periods and the social structure of the Post-Urban period.

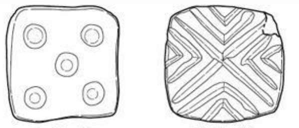
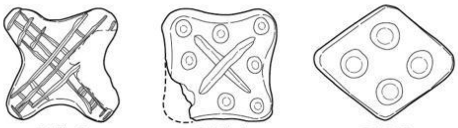
	Material	Shape	Design/ iconography	Examples
Post-Urban period	Terracotta	Square	Geometric	 1. Pk-10 2. Pk-44
		Circular	Geometric	3. C-42 4. C-43 5. Pk-17
			Figurative	6. Jk-3
		Geometric	Geometric	 7. Pk-3 8. Pk-6 9. Pk-9
		Rectangular	Geometric	10. Pk-18
	Copper/ bronze	Circular	Geometric	11. Pk-49

Fig. 12: Classification of Seals of the Post-Urban Period

Future Goals

Research on Indus seals and writing remains active and vibrant; scholars from across the world continue to apply diverse approaches. It is a good time to study Indus seals and writing! On the other hand, as Parpola nears retirement and fewer new seals are discovered, it is important to plan for the future. We have identified three major goals that should help ensure that the study of Indus seals and writing will continue in the future, summarized as follows:

1. Secure the CISI archive and digitize it
2. Create new database(s) and apply new tools (especially AI)
3. Increase collaboration

The CISI archive is the most important source for studying Indus seals and writing. Parpola and his colleagues have spent nearly fifty years compiling it, with the support of numerous institutions where seals and other inscribed materials are housed and cared for. Yet there is no curation agreement with any institution to ensure that the archive will be safely stored, digitized, and made accessible for future study. We are currently working with Parpola to achieve these goals and welcome support from all interested parties.

Once the CISI archive is digitized, it will be possible to create new databases that will facilitate continued research using new methods and tools. The creation of any new databases must balance legality with accessibility, and at this time, the nature and scale of these issues, as well as the possibility of creating open-source platforms, are not known. Any potential future open-source databases must be created with consent from the institutions and organizations who hold copyright privileges and or the original objects. The construction of new databases will require resources and tools that have not yet been widely applied to the study of Indus seals and writing. Crucial to the success of any such endeavors will be the application of new methods and technologies, especially Information Science and Artificial Intelligence.

Much like our approaches to the study of Indus seals, future research should be collaborative and multi-scalar. We envision and hope to support collaboration with scholars, students, and interested parties on a global scale. In the past, this has been challenging because the institutions where seals are housed are located across the world, as do the people who study them. These barriers are reduced today thanks to communication technologies, and the digitization of the CISI archive will provide further opportunities for collaborative research.

As mentioned earlier, seals and writing are not unique to the Indus Tradition; in fact, they were commonly used for thousands of years throughout the ancient world. There are scholars interested in learning more about Indus seals and writing, and we can benefit from learning about how similar objects are studied in contemporary cultures. Cross-cultural collaboration is an important future goal that should be prioritized. In our opinions, the best way to do that is to publish, attend conferences, and seek to make personal and professional connections with experts on ancient seals and writing who work in other regions and time periods.

Conclusions

Seals have a long history of use in South Asia, and our research has identified evidence of significant variation and continuities over time that provide insights into the roles they played in the societies that made and used them, and how these reflect aspects of their organizational dynamics. The diversity of seals throughout the Indus Tradition suggests that they were assigned to different meanings and functions, likely related to varying social, political, economic, and ideological systems. It is clear that seal production and its use changed over time in the Indus, but the significant role they played in integrating people and places was likely consistent across the periods in which they were made and used. The production and use of seals in ancient South Asia is closely correlated with the origins, fluorescence, and eventual decline of the earliest urbanism in the region. Therefore, they must be studied and interpreted in relation to this phenomenon and can provide insights into its nature and character.

During the Regionalization Era/Pre-Urban Period, the local development and use of seals represents a technological and social innovation, one of many that are associated with increasing, complexity associated with the origins of urbanism. The emergence of two regionally distinct styles of seals during this period represents different ways of making them. Differences in raw materials, morphologies, and motifs may represent diverse communities integrated in part by shared ideas and practices about why seals should be made and used. The presence of some seals from each group in the other provides important evidence of interregional connections, and both were characteristic of production during the Integration Era.

Seal production and use in the Integration Era/Urban Phase was more widespread and complex than in the preceding period, and this reflects the expansion of and increasing complexity of the Indus cultural system. In some ways, seal production becomes more standardized during this period: The overwhelming majority of seals were square in shape, made of fired steatite, and contain similar compositional elements. But not all seals from the Urban Period fit this description, and there are a wide range of iconographic motifs. Even those carved with the same motif, particularly zoomorphic and especially the unicorn, demonstrate clear variation in the ways they are carved. Some of these differences are patterned and likely reflect the idiosyncratic carving styles and skills of the artisans that made them. This, in concert with the discovery of unfinished seals at multiple sites, suggests that production was decentralized, not under a centralized authority or in one location.

The comparatively small number of seals assigned to the Localization/Post-Urban Period is significant because it demonstrates significant changes and continuities with the preceding period. The disappearance of inscriptions and iconography is perhaps the clearest indication that the organizational dynamics of the Urban Period have changed. Yet, continuities in raw materials, morphology, and geometric motifs provide evidence supporting the interpretation that the end of the Indus Civilization is best understood as a transformation, not a collapse. Seals are uniquely positioned to help investigate and fully understand this transition, which is one of our major goals for future research.

Overall, this research has contributed to our understanding of seal production and use during the Indus Tradition by focusing on long-term trends and changes, using multifaceted methods, and investigating variation at multiple scales. If we wish to learn more about seals and the important and varied roles they played in the Indus, it is necessary to examine the entire process: production, distribution, consumption, and discard, and how these changed and varied over time. Such a longue durée approach is useful to understand the complex and dynamic relationships among seals, the people who made and used them, and what this tells us about how they organized their societies in one of the world's earliest and most unique urban cultures.

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The Bead Making:
A Cultural Identity of the Harappan People

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Introduction

The Harappan civilization is celebrated for its advanced practices in a variety of occupations, including city planning, architecture, and pottery making. Among the many sophisticated crafts of the Indus people, bead-making stands out as a key cultural marker, showcasing their artistic skills, trade networks, and social practices. Indus beads come in a variety of shapes, sizes, and materials that included semi-precious stones such as carnelian, agate, and lapis lazuli, as well as shell, bone, metals, and terracotta. The process of bead-making involved intricate techniques of cutting, polishing, drilling, and etching, reflecting the high level of expertise possessed by Harrapan artisans. These beads were not only ornamental but also carried symbolic meanings and social significance. They were used in personal adornment to signify social status and may have also played roles in rituals or as amulets.

The diversity and refinement of bead styles suggest that it was a crucial commodity in the Harappan trade network. Beads have been found also in distant regions like Mesopotamia and Central Asia, indicating the extensive reach of Harappan trade connections[1]. Additionally, the uniformity of bead styles across different Indus cities points to a shared cultural identity and aesthetics of the civilization. The tradition of bead-making was probably passed down through generations, reinforcing cultural continuity and community bonds.

The Value of Beads: A Symbol of Culture

The relationship between bead-making and cultural identity is so deeply intertwined that it is challenging to separate the two. Beads, particularly those made with indigenous techniques, embody not only cultural value but also symbolize indigenous resilience. Echoing Marshall's perspective that "despite the terrible losses that have been suffered, the diversity is not dead;

1. Kenoyer, Jonathan Mark. "Indus And Mesopotamian Trade Networks:New Insights From Shell And Carnelian Artifacts." Bar International Series (1826): 19-28

it persists in the wake of Western domination" (Marshall, 1994: 414)[2], my aim is to illustrate how indigenous artists utilized transculturation to fortify their cultural identity. Beads have always had a prominent place in indigenous cultures. This paper will summarize my research on how bead-making continues to influence the study of Harappan artifacts. Far from being mere items of glass or shell, beads represent a profound form of social and cultural wealth. My research will demonstrate how beads transcended their material origins and became invaluable antiques, reflecting rich and multifaceted aspects of the Harappan culture. Although beads may be small in size, their importance in understanding the Harappan civilization is immense.

They offer insights into the social, cultural, and economic dimensions of the time, proving that even seemingly modest artifacts can provide crucial information about past societies. Indigenous bead-making is not a lost art, but a dynamic tradition shaped by both indigenous creativity and broader cultural exchanges.

Importance of bead-making

To fully appreciate the significance of beads, one must consider their archaeological context and their profound impact on cultural identity. Archaeological evidence shows that beads have played a crucial role in burial rituals within the Harappan civilization for thousands of years. They had been important markers of cultural identity and social status throughout history and continue to be significant in understanding Harappan culture today. Beads are essential for understanding the cultural signals among the Harappan people.

Historically, they were used to signify social status and cultural connections, a practice that continues in modern interpretations of Harappan culture. The role of beads extends beyond being a mere article of adornment; they function as a medium through which cultural values are communicated and preserved. Beads also serve as a form of artistic expression, with artisans drawing inspiration from their environment, dreams, and visions. The designs often carry personal and spiritual significance, reflecting deep cultural and religious beliefs.

The tradition of passing sacred motifs to future generations ensures that beadwork maintains its spiritual and cultural essence, preserving intangible cultural values. This paper does not seek to challenge existing perceptions but aims to highlight the holistic role of beads in capturing the essence of Harappan life, both proto-historically and in contemporary studies.

The research underscores the importance of beadwork as a distinctive aspect of Harappan cultural expression. Despite the limited academic focus on this subject, my hands-on experiences with bead-making, including sessions with Mr. Anvar in Khambat, have provided valuable insights into the craft's role in shaping and reflecting Harappan cultural identity.

What makes an activity a Culture?

An activity becomes embedded in a culture when it is consistently practised and deeply ingrained in the daily lives of a community. Such activities are more than functional tasks; they embody the

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2. Sahlins, M. (1994). "Cosmologies of Capitalism: The Trans-Pacific Sector of "The World System." In N. B. Dirks, G. Eley, & S. B. Ortner (Eds.), Culture/Power/History: A Reader in Contemporary Social Theory (pp. 412-455).

shared values, beliefs, and traditions of a group. They take on symbolic significance, reflecting the collective identity of the community and distinguishing it from others.

As these activities are handed down through generations, they become integral to the cultural fabric, shaping and reinforcing the group's identity. They contribute to a sense of belonging among the community's members, helping us to define who they are and how they relate to one another. Whether through ceremonial rituals, artistic expressions, or everyday practices, these activities become essential components of a group's way of life. Through their continuity and evolution, these culturally significant activities not only preserve but also adapt cultural traditions, ensuring that the community's heritage remains vibrant and relevant.

They become a testament to the group's enduring identity and cultural richness, illustrating how activities transform into defining elements of a culture.

What is Harappan bead-making Culture?

The Harappan bead-making culture, a defining feature of the Harappa Civilization, exemplifies exceptional skill and extensive trade connections. Harappan artisans crafted beads from carnelian, agate, shell, and terracotta, employing advanced methods like drilling, grinding, and polishing. These beads, imbued with cultural and symbolic significance, served not only as personal adornments and ritual objects but also as commodities in a broad trade network. Today, this ancient tradition continues in Khambhat, Gujarat, where age-old techniques and styles are preserved[3]. Despite regional variations, the consistency in bead quality highlights the enduring legacy and meticulous craftsmanship of the Harappan people across millennia and vast distances.

Bead-making process

Around 2600 BCE, as Harappan cities flourished, bead-making became a key craft for distinguishing elites from common people. Harappan elites and merchants, controlled bead-making technologies to create symbolic items that delineated economic and social classes. Beads were widely produced and used across the Harappan Civilization, with significant finds at sites such as Mohenjodaro, Harappa, Chanhudaro, Dholavira, Allahdino, Lothal and many other sites. At Chanhudaro, a notable bead manufacturing site was discovered, featuring a large workshop with unfinished beads, drills, and raw materials scattered throughout.

Many unfinished beads, metallic and stone drills, broken drills, ingot, nodules and cups were scattered in this building. A flue system used for heating provided insights into the bead-making techniques of the Indus culture (Mackay, E.J.H. 1935-38)[4].

Lothal revealed a 500-square-meter bead factory with a courtyard and multiple rooms. Here, archaeologists found jars filled with unfinished beads and raw materials, along with a kiln for heating materials (Rao S. R. 1973)[5]. These findings illustrate the Harappans' meticulous

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3 Arkell, A J. "Cambay And The Bead Trade." The Antiquaries Journal 10 (1936): 292-305.

4 Mackay, E J H. Further Excavations At Mohenjo Daro; Vol. I And Ii . Delhi: Government Of India Press, 1935-38.

5 Rao, S. R. (1973). Lothal and the Indus Civilization. New Delhi: Archaeological Survey of India.

approach to bead-making. Some very beautiful and tiny beads show a high workmanship and great care taken by Indus lapidaries. Further west, Shahr-i-Sokhta in Iran, unearthed by Maurizio Tosi in 1968[6], was a major trading hub linked to Sumer. Excavations revealed tools and semi-precious stones used in bead-making, confirming Shahr-i-Sokhta's role as a prominent center for stone bead production. The discovery of various tools and rare beads, including pendants of rock crystal, highlights the site's importance in the ancient bead-making industry.

Stone bead-making technology

The intricate process of crafting hard stone beads in the Harappan civilization reflects a thorough mastery of stone technology. Through thousands of archaeological finds, particularly those from Chanhudaro and Lothal, scholars like Possehl have traced the meticulous steps involved in transforming raw stones into exquisite beads. Each material required a unique approach, but the overall process reveals a highly organized and skilled craft that was central to Harappan culture. This methodical sequence of bead production not only showcases the technological prowess of the Harappan people but also underscores the cultural significance of bead-making as a marker of identity and social structure. There were several steps for different raw materials, but this elucidation is one of them.

Selection of Stone

Harappan lapidaries exhibited remarkable skill in choosing stones, carefully arranging natural patterns to enhance the aesthetic appeal of each bead. They tried to arrange the natural colour of the stone in such a manner that it would form a pattern and would give a better impression.

For instance, a bead from Harappa was cut to showcase consistent coloured bands at each end, reflecting the artisans' refined taste and attention to detail. This selection process was crucial, as it influenced the final appearance and cultural significance of the beads, which were often crafted from a variety of semi-precious stones (Beck, H.C. 1920-21)[7].

Heating

Heating was a key step in bead production, which was used to soften stones, alter their colour, or enhance their natural patterns. Stones like chert, agate, and jasper were heated in earthen bowls, often with sawdust as fuel, before being cut and shaped. According to S.R. Rao, stones like chert, agate and jasper were first heated in an earthen bowl using saw dust as fuel to smoothen them. Then the stone was reduced to the desired size by giving it a blow and cut into shape by flaking. The Harappans distinguished between agates (the most commonly used stone at Harappan bead-making culture) that required baking and those that did not. Some

6 Tosi, M. (1968). Excavations at Shahr-i Sokhta: First Preliminary Report on the Excavations of the Italian Mission. Rome: IsMEO

7 Beck, H. C. (1920-1921). Excavations at Harappa: Report on the First Season's Work. Lahore: Government of the Punjab.

types of agate contain small amounts of water and have a high absorption capacity, which increases with heat.

Mackay suggests that when these stones are treated with sugar and sulfuric acid, they turn black. Carnelian, another stone used to create stunning beads, was not commonly found in Mohenjodaro and Harappa but was widely used in Chanhudaro and Lothal. Beads made from carnelian have also been discovered at sites like Rangpur, Kalibangan, and Rojdi. The stone's natural colour is red, but some broken beads reveal an uneven coloration inside, suggesting that a chemical process might have been applied to achieve a uniform surface colour.

Sawing and Cutting

Stones were sawn and cut by fixing them in a strong frame and using a copper or bronze saw, often with an abrasive like emery or quartz. This method allowed artisans to shape beads with precision, creating intricate designs—such beads have been found at various Harappan sites, including Mohenjodaro and Harappa. Beck[8] has described the process of sawing as follows:

"The stone is firmly fixed in a strong frame composed of two uprights joined at the base by a bar, the cement holding the stone, was made of cloth-fibres and bea-wax. The edge of an iron plate was fixed in a light wooden frame and, according to the size of the stone, is rubbed backwards and forwards by one or two men. Then it was chipped to a shape, with a copper or bronze saw. But the two metals are so soft that their use without some abrasive like fine emery or powdered quartz and water seems futile. Among the two, copper would have been better in action. Beads which were made with agate chips and chalcedonic matrix have been described as chalcedonic agate breccia and these have been collected from Harappa and Mohenjo-Daro."

Drilling

Drilling was a specialized craft in Harappan bead-making, requiring tools like stone or metal drills to create precise holes in the beads. Broken and perfect drills found at sites like Chanhudaro, Dholavira etc. suggest that stone drills, possibly mounted in a bow, were commonly used.

The drilling process was so precise that holes drilled from opposite ends of a bead would meet perfectly at a central point, showcasing the advanced skills of Harappan craftsmen. Before, the final polishing drilling was done. The drills were straight, rod-like tools with small depressions at their tips, designed to hold fine emery abrasive and water, providing the necessary grip for drilling. Sir Mortimer Wheeler and Mackay proposed that these drills were made from black or brown chert and were used with a bow. Wheeler also considered the possible use of tubular bronze drills. However, S.R. Rao disagreed, arguing that the drills were made of bronze. Marshall suggested that a copper rod combined with emery powder was used for drilling.

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8 Beck, H. C. "Classification And Nomenclature Of Beads And Pendants." Journal Of The Society Of The Bead Researchers Vol-18 (2006): 1-79.

Mackay, based on findings of both broken and intact stone drills at Chanhudaro, believed that stone, rather than metal, drills were employed. He also suggested that pump drills might have been used. It appears that an initial point was deepened to prevent the drill from slipping, though it's uncertain if this depression was intentionally carved or formed during the boring process. Since this feature is present in nearly all unfinished beads, it seems likely that the depression was made deliberately.

The drilling technology of the Harappan culture was highly advanced, utilizing various types of chert and jasper to drill different materials. Earlier studies relied mainly on macroscopic observations to identify aspects like drill manufacturing techniques, raw materials, and the mechanics of drilling. However, these generalizations have been refined with the discovery of significant workshop areas and the application of advanced tools like SEM, XRD, and electron microprobe analysis. This paper will summarize the latest research on drilling and categorize the ancient drills into two types: tapered cylindrical drills and constricted cylindrical drills. Beads were meticulously drilled from both ends, with such precision that the holes almost always aligned perfectly at a single point. The clarity of stones like carnelian and crystal aided the artisans, allowing them to visually ensure the drill remained on a straight path.

Matching the drill's hardness to that of the stone might seem challenging, but according to Mackay, the process was manageable with the use of emery and water. However, the hardness of the stones sometimes caused drills to break, as evidenced by unfinished beads found with broken drills.

It remains unclear whether the drill or the bead was in motion during the process. For the numerous disc-shaped minute beads and micro-beads, which were too small to be hand-drilled, it's believed that a lathe or jig was employed. Insights from Shahr-i-Sokhta shed light on this process, where wooden tablets with holes of various diameters were discovered. These tablets likely served as supports during drilling, holding the bead securely in place while a bow drill was used. This setup would have made the drilling process more efficient for the craftsman. The bow drills, made with a wooden shaft held perpendicular, featured stone handles crafted from materials like serpentine, alabaster, and gray sandstone.

Grinding/Polishing

After drilling, beads were polished by rubbing them against another stone. According to Mackay, this polishing process was carried out using a lathe hone of varying grades, a method still practiced in Cambay. He also suggests that finely divided iron oxide on a leather-covered board would have been ideal for achieving a smooth finish. The exact method used to polish long beads, which had exceptionally smooth ends, remains a mystery. In modern times, a leather bag filled with fine emery, carnelian powder, and the beads is rotated until polished. While effective for shorter beads, this technique would likely have caused longer ones to break. Despite the uncertainty surrounding the tools used, the method was evidently effective, as the holes in the beads were polished as well. Some unfinished beads show sharp edges that could cut the thread they were strung on, indicating that hole polishing was crucial for maintaining the bead's transparency.

Final polishing occurred after drilling, preparing the bead for the market. It seems unlikely that beads were drilled before being shaped and polished, as this would have complicated other manufacturing steps. According to Rao, beads were heated to achieve the desired cluster. Carnelian beads were produced using the same techniques as agate beads. The holes were initially splintered rather than cut and later smoothed and polished. Beads were ground into shape by stringing them on a thread or copper wire and rolling them back and forth on grit stones of various grades. The conical holes in carnelian beads were also polished to maintain their transparency. Long barrel-shaped carnelian beads are considered among the Harappans' greatest technical achievements. The entire process, from stone selection to final polishing, reflects the Harappan people's deep understanding of stone technology and their commitment to creating beautiful, culturally significant beads that served as markers of identity and social structure.

Etching on Beads

The art of etching carnelian beads stands as a testament to the Harappan civilization's sophisticated craftsmanship, particularly at Chanhudaro, where these beads were first produced and later exported to other cities during the Pre-Sargonic period and beyond. S.R. Rao highlights how Harappan artisans created carnelian beads by heating agate pebbles in kilns and adorning them with intricate designs using alkali. This unique decoration process, known as "etching[9]," involved applying paint to the carnelian surface, resulting in three distinct types of etched beads:

- Type I: White patterns on a red surface.
- Type II: Black patterns on a whitened stone surface.
- Type III: Black patterns etched directly onto the stone a rare variety.

The etching process was first documented in 1857 by Bellasis, who studied the technique used in 19th-century Sehwan, upper Sind. He discovered that the main ingredients for the paint included potash, white lead, and the juice of the Kirar bush (Capparis aphylla)[10].

This thick liquid was applied to the bead surface with a smooth pen, after which the beads were subjected to high temperatures. This process caused the stone to absorb the paint, creating a permanent, glassy pattern. A microscopic examination shows that the effect of etching was to produce a number of minute spots, under different coefficients of expansion. This white layer does not affect the extreme surface and the soda enters into the body of the bead in very minute particles. In the broken etched beads, it can be seen that the white colour has penetrated layers of paints flakes off and resulting in a distinctive, inlaid effect which produces inlaid beads.

A similar process of etching has been observed by N.G. Majumdar[11]. He described a similar

9 Dikshit, M. G. Etched Beads In India. Pune: Deccan College Monograph Series, 1949

10 Bellasis, M. (1857). Notes on the Paints and Pigments Used in 19th-Century Sehwan, Upper Sind. Journal of the Asiatic Society of Bengal, 26, 45-59.

11 Majumdar, N. G. (1955). The Bead Industry of the Indus Civilization. Ancient India, 11, 1-48.

etching process involving a thick liquid made from washing soda, water, and Kirar bush juice. The beads were placed in a clay mould, with the exposed surface decorated using a reed or steel pen before being dried in the sun and then heated to make the design permanent.

- Type I carnelian beads, featuring white patterns on red surfaces, were commonly found in India and beyond, including at sites like Ur, Nineveh, and Tel Asmar in Mesopotamia. The artisans of Sindh enhanced the etching by applying plant juice to the bead surface before baking, a technique still in use today in Persia, China, Tibet, and Sindh.

- Type II carnelian beads were first whitened with alkali and then designed using a metallic nitrate, likely copper nitrate. Beck's research suggests that the black colour was achieved using copper, cobalt, or manganese, with manganese giving a purplish hue unless applied thickly. Initially considered rare, Type II beads were later discovered at multiple sites, including Kausambi, Taxila, Mohenjodaro, and Chanhudaro, with the oldest specimen dating back to 2300 BCE.

- Type III carnelian beads, featuring black designs on natural red surfaces, are exceedingly rare, with one known specimen from Harappa dated to about 2300 BCE. These beads required careful heating, as too much heat could ruin the colour, while insufficient heat would cause the design to flake off.

According to Mackay, the second type of bead was relatively easy to make and could serve as a fallback if the first two types of beads making failed. Some beads show surface patination, possibly due to soil conditions, but if intentional, it may have been an attempt to create an 'eye' effect. The fact that many etched beads were found unperforated suggests that drilling occurred after the decoration process, further emphasizing the precision and care involved in Harappan bead-making. It seems that beads were drilled after decorating them. Many etched but unperforated beads of Chanhudaro and other sites ascertain this opinion.

Steatite bead-making technology

Steatite, an important and prized raw material, played a pivotal role in the bead-making traditions of the Harappan civilization. Sourced from across India, including key sites such as Mohenjodaro, Chanhudaro, Lothal, and Rangpur, steatite beads were so abundant that Beck aptly termed the Indus civilization the "steatite civilization" (Vidale 2000:59)[12]. Although steatite beads date back to the Neolithic period at Mehrgarh around the 6th-5th millennium BCE, their popularity soared during the Harappan Civilization era, becoming a popular and favourite medium for artisans. Vidale has carried out studies with the scientific and experimental approach to reconstruct the process of making steatite disc beads as that existed during the early Chalcolithic period at Mehrgarh and the Harappan sites (Vidale 1995: 45-80)[13].

12 Vidale, Massimo. "The Archaeology Of Indus Crafts: Indus Craftspeople And Why We Study Them." Isiao, 2000.

13 Vidale, M. (1995). "Reconstructing Early Chalcolithic Steatite Bead Production at Mehrgarh and Indus Sites." Journal of South Asian Archaeology, 12, 45-80.

The journey of steatite bead production began with the collection and transportation of raw steatite nodules to manufacturing hubs like Mehrgarh, Harappa, and Mohenjodaro. Excavations at these sites have unearthed numerous steatite nodules, underscoring the organized effort to transport materials to production centers. Vidale's scientific and experimental studies reconstructed the early Chalcolithic bead-making process, revealing that steatite nodules were first ground into elongated rods.

These rods were then sliced into polygonal blanks using fine-toothed copper and bronze saws, as documented by Kenoyer (Kenoyer, 1997:160)[14]. Stone blades, while used for cutting larger steatite lumps, were not employed for shaping the delicate bead blanks. The polygonal blanks often received faceted edges through meticulous grinding before being perforated with chert drills.

At Mehrgarh, chert drills were produced locally, a practice that continued in Mohenjodaro, Chanhudaro, and Bagasara during the Harappan period. Once perforated, the bead blanks were strung on cords and polished by rolling them diagonally on hard surfaces, a process that involved repeated regrinding and smoothing to achieve a refined finish.

Another method involved chipping and micro-chipping steatite nodules to shape the beads, a technique that required exceptional skill to prevent breakage and was thus less common in archaeological findings.

Innovative approaches to bead-making included shaping steatite paste by hand pressing or pinching, followed by perforation with a stick and firing. For micro beads, powdered steatite paste was formed into long tubes and then cut into small segments. Deo's method involved immersing a cotton or silk string in a steatite powder solution, heating it to burn the string, and thereby creating hollow tubes that could be sliced into numerous beads efficiently (Deo 2000:20)[15]. Hegde and his colleagues further advanced this technique by suggesting the use of pressure to squeeze steatite paste through apertures, producing tubular micro beads that were subsequently cut and baked (Hegde et al. 1982:239-244)[16].

Mould-based bead production was another sophisticated technique, where steatite paste was shaped in moulds and painted to mimic the appearance of more luxurious stones like banded agate or etched carnelian. Such painted steatite beads were discovered at Mohenjodaro, demonstrating the artisans ability to replicate intricate designs. Additionally, some beads were bleached with alkali and fired to achieve a glazed surface, akin to faience bead manufacturing. This glazing process required precise temperature control to prevent the beads from turning black due to excessive heat.

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14 Jonathan M, Kenoyer. "Trade And Technology of The Indus Valley: New Insights From Harappa, Pakistan." World Archaeology Vol-29(2) (1997): 262-280.

15 Deo, Shantaram Balchandra. "Indian Beads A Cultural And Technological Study. ." Pune: Deccan College Post-Graduate And Research Institute (2000).

16 Hegde, K. T. M., Et Al. "Archaeometallurgy In India." Bangalore: Indian Institute Of Science, 1982.

The Harappan mastery of steatite technology not only highlights their technical ingenuity but also underscores the material's integral role in their cultural and economic life. From the meticulous crafting processes to the widespread distribution of steatite beads, this technology was a cornerstone of Harappan identity, reflecting a civilization deeply invested in artistry, trade, and innovation.

Faience bead-making technology

The art of crafting faience beads stands as one of the most sophisticated and revered techniques in Harappan bead-making culture. These beads, found in abundance at major Harappan sites like Mohenjodaro, Harappa, Chanhudaro, Lothal, and Rangpur, reflect the intricate skill and innovation of the Harappan people. Faience, often hailed as "man's first conscious attempt at creating synthetic material," was a marvel of ancient technology[17].

The process of creating faience beads began with a carefully prepared paste, made from a blend of quartz or steatite sand, a glassy flux, and a colouring agent. This mixture was then moulded into the desired shape, dried in the sun, and baked. The perforation of the beads was ingeniously achieved by rolling the paste around a thread, which, when burned during the baking process, left a hole in its place. To bind the grains together, substances like silicate of soda or alkali were likely used, resulting in a granular structure that made the beads soft and delicate.

O.P. Jaggie offers an alternative method for producing faience beads, where the colouring agent was not mixed into the paste. Instead, a thick mixture of quartz sand, flux, and caustic soda was pressed into a mould. Once dried, a glaze made from sand, soda, borax, lime, and a colouring agent—such as copper, iron, or lead—was applied. The beads absorbed this glaze before being baked in a kiln. The presence of black specks on some beads is thought to be the result of carbonized adhesive, used to hold the paste together before glazing and firing[18].

The faience beads unearthed from various Harappan sites display a wide array of shapes and colours, ranging from blue and green to yellow, black, white, chocolate, and red. Blue faience beads, in particular, were produced in two distinct methods. In the first method, the colour was mixed directly into the paste, resulting in a uniform hue throughout the bead. In the second method, the colour was applied only to the surface, meaning it could sometimes lack uniformity, revealing patches where the colour had not adhered properly.

The true colour of these beads could be discerned by cutting them in half. For example, yellow and white faience beads were often made using the second method, which sometimes resulted in the colour being confined to the surface and peeling off in patches. Black faience beads, found in significant numbers at Harappa, were predominantly coloured using copper, with traces of iron occasionally present. A microscopic examination reveals that some black material was mixed with the quartz grains after moulding.

17 Vidale, Massimo. "Early Harappan Steatite. Faience And Paste Heads In A Necklace From Mehrgarh-Nausharo (Pakistan)." East And West 39(1-4) (1990): 291--300.

18 Jaggie, O. P. (Year). "Techniques in Faience Bead Production: An Alternative Method."Journal of Ancient Technologies, 15(2), 123-145.

In terms of manufacturing technique, faience beads—whether fine or coarse—were subjected to high temperatures during baking. The process for creating cylindrical and thin wafer beads closely mirrored the process used for making steatite beads.

The paste was rolled around a thread, baked in a furnace, and as the thread burned away, the bead was left with a central hole. Additionally, some faience beads were made by moulding a long, segmented block, which was then cut into smaller pieces. Occasionally, these blocks would break on their own into the desired bead sizes.

The technology behind faience bead production not only highlights the advanced craftsmanship of the Harappans but also underscores their innovative spirit in creating and perfecting synthetic materials. Each bead, in its vibrant colour and intricate design, tells a story of a civilization that valued artistry, technology, and cultural identity.

Vitreous Paste bead-making Technology

Vitreous paste beads represent another remarkable facet of Harappan bead-making ingenuity. These beads, discovered at sites like Mohenjodaro and Chanhudaro, share similarities with faience beads but stand out due to their more lustrous glaze and enduring finish.

Vitreous paste beads were not unique to the Harappans; references to similar materials have been found at ancient sites in Susa, Egypt, and Knossos, highlighting the widespread use and appreciation of this technique across different cultures. The production process of vitreous paste beads closely mirrored that of faience beads. The beads were crafted by mixing a glaze with silicon powder and then carefully baking the mixture at high temperatures. This baking process required meticulous control, as excessive heat could dull the bead's colour and glaze, leaving it with a pale, lackluster surface. When executed correctly, however, the result was a bead with a vibrant, glossy finish, typically in shades of apple green or turquoise blue.

Interestingly, some beads unearthed from Mohenjo Daro have been labelled as "paste-beads" due to the difficulty in identifying their base material. These beads, often white or pale gray, suggest that their original glaze has faded over time, leaving only hints of their former brilliance. Despite these challenges, the craftsmanship behind vitreous paste beads is undeniable. Mackay, a prominent archaeologist, suggested that many faience beads, upon closer examination, might actually be vitreous paste beads, indicating the subtle complexities in Harappan bead technology.

The Harappan lapidaries, with their extensive knowledge and experience, were not just bead makers—they were innovators. They approached bead-making with a deep sense of artistry and experimentation. Whether working with natural stones or adding artificial enhancements, they demonstrated exceptional care and attention to detail. When using variegated stones, for instance, they often capped the ends with gold to enhance the stone's natural beauty—this is a technique practised in Sumer also. Their expertise extended to working with veined stones, where they skilfully positioned the natural veining in each bead to create a harmonious pattern. This level of craftsmanship led to the creation of some truly rare and exquisite beads. For example, they produced segmented beads with alternating sections of red carnelian and light

blue chalcedony, so seamlessly joined that the materials appeared indistinguishable until they were broken open in their canister.

Another remarkable bead combined shell and pink limestone to mimic onyx, with one side made of limestone and the other of shell. Mackay concluded that the Harappans displayed extraordinary skill, care, and creativity in their bead-making practices. Their work with vitreous paste beads, alongside their innovations with natural and artificial materials, not only reflects their technical prowess but also their deep appreciation for beauty and craftsmanship, which continues to captivate us today.

Metal bead-making Technology

The Harappan civilization demonstrated remarkable skill not only in crafting beads from stones and clay but also in the art of metal bead-making. Although evidence of metal bead craftsmanship is not abundant or highly varied, the discovery of beads made from various materials across numerous Harappan sites indicates their sufficient knowledge of metalworking technology. Excavations at these sites have uncovered beads made of gold, silver, and copper, with gold and silver beads being particularly prevalent.

Among the most intriguing finds are the spacer beads, which vary in size and design. These spacer beads are further categorized based on the number of holes they possess: 17 beads with two holes, four with three holes, 15 with four holes, and one with six holes. These beads were likely used in different types of jewellery, adding both beauty and functionality to Harappan adornments. The hollow terminal beads from the Mandi hoard are another fascinating example of Harappan metalworking.

Eighteen such beads, each with slightly varying measurements, were discovered. The paired nature of these beads suggests that they were used in necklaces, with the 18 hollow terminal beads possibly representing nine distinct necklaces. In addition to gold beads, the Mandi hoard also includes beads made from banded agate, copper, and onyx. The craftsmanship involved in creating these beads was varied and complex, reflecting the Harappans' mastery over metalworking techniques. One method involved hammering a metal piece into a sheet, which was then folded into the desired bead shape and size[19]. This method was notably used in the creation of gold beads found at Lothal.

Terracotta bead-making Technology

Terracotta beads are another testament to the Harappans' innovative spirit, commonly found in excavations from the Neolithic and Chalcolithic periods. The earliest terracotta beads in India were discovered at Mahagara in the Ganga Valley, dating back to the Neolithic period. These beads were handmade, requiring the selection of suitable clay as the first crucial step. The process of making terracotta beads involved shaping the clay by hand, either by pressing it into the desired shape or rolling it against a surface. Some beads were

19 D. V. Sharma, V. N. Prabhakar, R. Tewari And R. K. Shrivastava. "Harappan Jewellery Hoard From Mandi." Puratatva No. 30 (2000): 36-49.

made by combining rolling and pinching methods. Before firing, perforation was achieved using a stick of bamboo or reed, and decorations were added with a pointed object or stick. The more intricately decorated terracotta beads were often made using moulds, a technique that allowed for the production of beads with complex designs.

Excavations at Harappan sites like Rakhigahri, Tarakanewala-dera, and Sikarpur have revealed terracotta beads that imitate the shapes of popular stone beads, particularly the long cylindrical carnelian beads typical of the Indus civilization[20]. At Banawali, terracotta beads imitating stone and faience beads were discovered, along with terracotta beads featuring gold inlay, highlighting the Harappans' creativity and attention to detail. Additionally, at Harappa, terracotta beads made from different coloured clays were found, designed to mimic the appearance of banded agate beads[21].

The diversity and sophistication of metal and terracotta bead-making techniques in the Harappan civilization reflect not only their technical skill but also their deep cultural connection to personal adornment and craftsmanship. These beads, whether made from precious metals or humble clay, were more than just ornaments; they were a vibrant expression of the Harappan identity and their enduring legacy in the world of ancient craftsmanship.

Conclusion

As we've explored the various manufacturing techniques of Harappan beads, it becomes evident that each step in the process was a testament to the skill, precision, and creativity of the Indus people. The intricate art of bead-making in the Harappan Civilization was far more than a simple craft; it was a profound expression of their cultural identity, artistic genius, and sophisticated social structures. From the careful selection of flawless stones, ensuring that the natural beauty of materials like agate was enhanced through strategic placement of bands and spots, to the meticulous heating, flaking, and cutting processes, every bead was a masterpiece in its own right.

The Harappans' ability to manipulate stones through heating, a technique still recognized today, softened hard materials like agate, jasper, and chert, making them easier to work with. The controlled flaking of stones, followed by the precise sawing and cutting into desired shapes, required not only technical skill but also an artistic vision. Drilling, a critical step in bead production, demanded exceptional care and knowledge, especially when using metal or stone drills. The challenge of aligning holes drilled from both ends to meet perfectly in the middle speaks to the advanced understanding of geometry and craftsmanship possessed by these ancient artisans.

Polishing, the final touch in the bead-making process, remains somewhat of a mystery in terms

20 Bisht, R.S. "Jewels And Jewellery In Early Indian Archaeology And Literature." Stone Beads Of South And South-east Asia Archaeology, Ethnography And Global Connections (2017): 15

21 J. M. Kenoyer, K. K. Bhan, And M. Vidale. "Agate Beadmaking: An Ethnoarchaeological Study. Tn Preparation." 1993 (N.D.).

of its sequence with drilling, but it undeniably added a refined finish to the beads. The use of animal-shaped stones for polishing indicates a deep connection between the Harappans and their natural environment. The decoration of beads through etching, particularly on materials like agate, carnelian, and steatite, further highlights their sophisticated aesthetic sensibilities. Faience and steatite beads, crafted through innovative methods involving the use of quartz or steatite powder, demonstrate the Harappans' mastery of synthetic materials. These beads, once subjected to high temperatures, not only became harder but also closely resembled natural stone beads, showcasing their advanced technological capabilities. The production of micro-steatite beads, possibly using copper or bronze discs with multiple holes, reflects the precision and attention to detail that characterized Harappan bead-making. While our understanding of these ancient techniques comes primarily from experimental studies conducted at archaeological sites, it is clear that the methods of bead manufacture have remained remarkably consistent from the dawn of civilization to modern times. The Harappan lapidaries, through their dedication to their craft, left behind a legacy of beauty, skill, and innovation that continues to captivate and inspire. Their beads are not just artifacts; they are enduring symbols of a civilization that valued artistry, trade, and cultural cohesion, connecting the Indus people to the wider ancient world and leaving an indelible mark on human history.

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Indus Valley Civilization and its Material Culture in South India

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Discovery of the Harappan Civilization

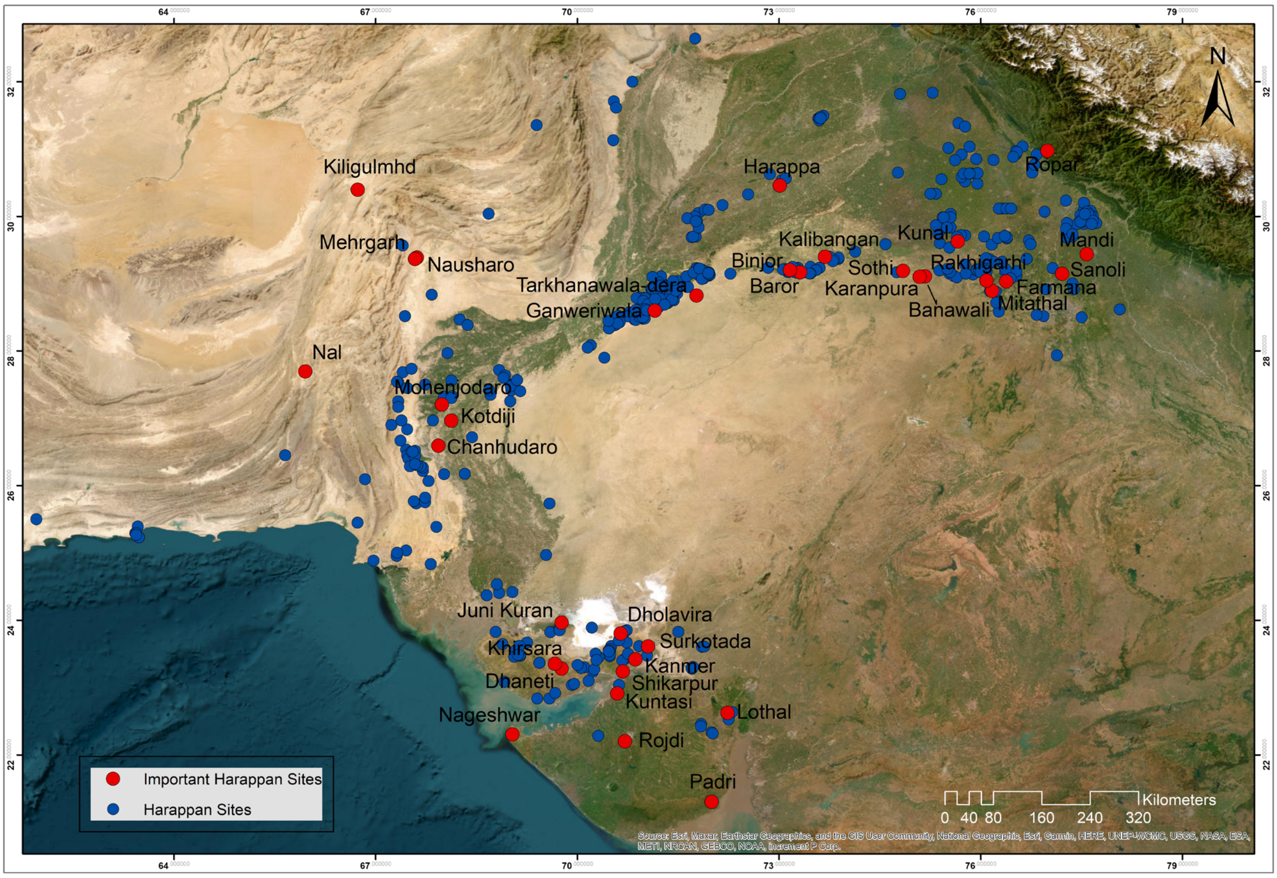
Hundred years after it was first discovered, when in 1921-22, the excavations were carried out by R D. Banerjee at Mohenjo-daro and by Daya Ram Sahni at Harappa (now both in Pakistan). They found identical structures, seals and other antiquities which led Sir John H. Marshall, in 1924, to announce to the world the discovery of this great civilization in *The Illustrated London News*, adding that it has 'in a single bound taken our knowledge of the Indian civilization some three thousand years earlier'.

The first man to visit Harappa in 1826 was Charles Masson, who deserted the British Army and roamed in Punjab and the north-western region in his quest for antiquarian remains. He came in contact with Alexander Burns, who as an emissary of the British King William IV, was going to Lahore to present five horses and a carriage from the King of England to Maharaja Ranjeet Singh.

Masson has recorded that en-route to Lahore from Multan he saw the mound, a castle and extensive ruins at Harappa with ancient bricks strewn all over the area. Though both the visitors recorded the ruins, they were blissfully ignorant that the site contained the remains of one of the most ancient civilizations of South Asia.

The records of both the travelers were noticed by Sir Alexander Cunningham, who made two visits to Harappa in 1853 and 1856 respectively, followed by a small excavation in 1872 and mentions that materials are 'foreign to India'. However, the explorations and excavations of various scholars in both India and Pakistan has revealed more than 3500 Harappan sites in Indian sub-continent of which more than 2500 has been located in India (Map-01).

Indus Valley Civilization, also known as Harappan Civilization, Sindhu-Sarasvati Civilization, Indus culture spans from 6000–1300 BCE. This formative stage is referred to as Early Harappan, datable to 6000–2600 BCE,



Map 1: Important Indus Valley (Harrappan) Sites

The Amri-Nal is one of five regional cultures that make up the Early Harappan phase, while the other Early regional cultures include Sothi-Siswal, Kot Diji, Damb Saddat, and Anarta-Padri (Shinde 2023). During the Early Harappan times, it has at least some of the following typical cultural traits, viz., knowledge of building citadel; bricks in the ratio of 1:2:3; dish on stand pottery; fish scale and pipal lead design on the pottery; horned' design later developed into Horned deity in Mature Harappan; some sort of distant trade mechanisms; using seals without any script; bone tools and micro blades of chalcedony; triangular terracotta cakes; chert blade industry and burial system. However, it had not achieved the 'State of Urbanization'.

The next stage is the most advanced and characterised by the presence of urbanisation and development of state organisation; this era is referred to as the Mature Harappan phase datable to 2600–1900 BCE. The site of Manda on the River Beas in Jammu indicates the northernmost limit of the Harappan Civilization, while Bhagtrav on the Tapti, near the border of Maharashtra and Gujarat, appears to be the southernmost frontier. Alamgirpur on the Hindon River in Western Uttar Pradesh is the easternmost limit, and Sutkagendor, along the Makran coast near the Iranian border, could be the western limit. The Harappan culture appears to be a blend of many ethnic groups, representing a variety of cultural identities. Different categories of sites emerged during the Harappan Civilization phase, and it is evident that there were

symbiotic relations between them (Shinde 2023). The cardinal cultural traits of this phase are divisions in the settlement; systematic town planning; use of kiln-fired bricks or sun-baked mud-bricks of standard dimensions having the ratio 1:2:4; building of citadels, platforms for houses, podiums, seals and sealings with animal and human representations along with the pictographic scripts; black-on-red painted pottery showing naturalistic and geometric designs; the typical shapes being dish-on-stand, goblet, beaker, 'S' shaped jars and perforated jars, etc; long parallel-sided chert blades; beads of carnelian, steatite and faience; weights of agate; use of copper and bronze; terracotta toy-cart frames, mother goddess figurines and triangular or oval cakes; use of cotton, barley and wheat and burials. The declining phase of the civilization is termed as Late Harappan phase, datable to 1900–1300 BCE, marked by the collapse of urbanisation and declines in lifestyle, material culture, and technologies. The emergence of a few local rural cultures becomes evident in this phase. Diamabad in Maharashtra appears to the southern limit of this phase while Alamgirpur on the Hindon River in Uttar Pradesh is the easternmost, Shortugai in Afghanistan could be the northern limit and Sutkagendor, along the Makran coast near the Iranian border, could be the western limit (Rajesh; pers. comm.).

Settlement pattern of the Harappans

The settlement pattern of Harappan sites depends up on various factors. The availability of water resources for optimum agricultural production, potential pastoral land, wealth of natural resources, forest products, accessibility to the industrial raw material, inter and intra-regional connectivity through established trade routes and others alike played a dominant role in the formation of settlements. However, the close study of Harappan sites in Gujarat and Ghaggar, Hakra river valleys provided some clue to understand this phenomenon where this area has revealed more than 1600 Harappan sites. Some of the important excavated early, mature and late Harappan sites in different ecological zones are briefly described to understand settlement pattern, architecture, ceramics, material cultures etc. and its continuity in South India.

Physiography of Gujarat Plains

Physiography of Gujarat comprises of three main physical divisions namely, viz., The Gujarat Mainland, The Saurashtra Peninsula and The Kachchh.

The Gujarat Mainland consists mostly of hill ranges, uplands and shallow alluvial plains, unidirectional movements along the major east-west lineaments since the late Cretaceous have not only resulted in a youthful topography, but also accentuate the structural pattern (Biswas 1971:223-235). With annual rainfall ranges from 1525 to 2550 mm and covers an area of 83,528 sq.km. Kathiawar, popularly known as Saurashtra peninsula, was once an island or a group of islands of volcanic origin separated from the mainland, is built on Deccan Trap basalt. The Kachchh peninsula is located in the north-eastern part of Gujarat, forms an independent geographical and geological unit through which passes the Tropic of Cancer. This semi-arid land has nearly 27 river basins or streams which either run north or disappear in the Rann or the sea or the Gulf of Kachchh, but receives an average rainfall of 400mm.

Important Excavated Harappan Sites in Gujarat region

Dholavira (23°53'N: 70°13'E), Dist. Kachchh

Dholavira is situated on the Khadir Island in the Great Rann of Kachchh was one of the five largest Harappan settlements in the subcontinent. The site was bounded by the seasonal nala, Manhar and Mansar was first occupied by the Harappans of Amri association during 3rd millennium BCE. During the Mature Harappan Phase, the city proper was conceived as perfect rectangle bounded by massive mud brick masonry wall with three principle divisions of lay out. Apart from the above, it is unique for its reservoirs (both rock cut and structural), check dams, 10-letter signboard and varieties of burials jewellery and other antiquities, besides water harvesting system. The excavation conducted by Bisht of the Archaeological Survey of India has revealed seven cultural sequences dated from 3500 – 1700 BC, signifies the gradual rise, culmination and the fall. The settlement of stage I was a strong fortress rose in mud bricks in the citadel area. In stage II, a residential area was added to the north of the walled settlement and the stage III was the most important phase, during which the fortress was made into a formidable castle and another walled sub division, namely a bailey was added to it. In the north, residential area of stage II was cleared of its structures for carving out a ceremonial ground with stadiums on both the sides. Further north, an extensive walled town i.e. middle town was founded. Reservoirs were created on the south, west and north of the built-up divisions with an outer fortification wall. During the late phase of this period, the settlements were damaged by an earth quake, although the repairs were undertaken, the lower town was added. Stage IV belongs to the classical Harappan and almost all the salient features of the city planning were maintained along with the monumental structures such as gateways, fortification and drainage system. Stage V is characterized by the general decline and the site was temporarily deserted and in the next period, the transformation to the late Harappan phase is noticed, where the residential buildings were laid out in a different planning and after a century they abandoned the settlement. The site was re-occupied by a new set of people in stage VII who built their houses in circular form without any planning and reused the materials of the early phases including in the structures.

The ceramic assemblage spanning all seven cultural stages is divided into Harappan and associated wares. Harappan wares include Red, Pink, Buff, and Gray/Black wares while the associated wares, distinct in fabric and decoration, comprise medium coarse red ware, coarse red ware, reserved slip ware, black and red ware, kaolinite ware, cut ware and barbotine wares. The site also yielded numerous inscribed materials on various stones, pottery and stoneware bangles, along with significant graffiti sherds. The graffiti includes Harappan script, geometric designs, numerals, and abstract patterns. The prominent find is a large signboard with ten letters in Harappan script, likely placed above the North Gate and a limestone slab with partially preserved letters from Granary. The material culture in the form of beads of various materials like agate-carnelian, jasper, lapis lazuli, chalcedony, faience, terracotta, shell, vesuvianite, turquoise, and amazonite with etched, bleached, decorated carnelian beads, 'Ernestite' drill bits used for perforating hard stones, the metal objects includes gold, copper, bronze, lead and

silver. Analysis of gold artefacts indicates extensive trade and connections with various sources. Copper artefacts include antimony rods, arrowheads, bangles, blades, blade axes, chisels, fish hooks, knives, nails, points, razors, rings, rods, spearheads, and spindle rods. The presence of numerous copper slags and crucibles indicates local smelting and illustrate the advanced metallurgical skills of the Harappan society, including techniques like alloying, cold work, annealing, and closed casting. The use of lead in limited quantities, with artefacts including lead ores, a rod-like object, cubical weights, a sling ball, a circular disc, and a stamp seal. The silver artefacts are rare, comprising a short bead, thin silver sheet fragments, and corroded silver wire.

The partial study of faunal remains noticed are black buck (Antilope cervicapra), Chital / deer (Axis sp. / Cervid), cattle (Bos indicus), goat (Capra hircus), sheep (Ovis aries), oranger / wild ass (Equus hemionus), chinkara (Gazella bennetti), water buffalo (Bubalus bubalis), fox / wolf / dog (Canid sp.), rat (Rattus rattus), hare (Lepus nigricollis), wild boar (Sus scrofa) and bird.

The cemetery at Dholavira, located to the west of the city features a diverse range of funerary monuments. The majority of graves align with the typical north-south orientation and revealed six major types of funerary structures, viz., 1. A rectangular memorial is further classified into three distinct variants viz., Built memorial, Cist, or Cist in Cairn and Rock-cut, 2.Cairn: round, oval, long oval, or egg-shaped, 3.Composite graves in a circle, a semicircle, or a rectangle, 4.Fractional Burial, 5.Inhumation and 6.Hemispherical monument or tumulus

As a whole, Dholavira was a safest port, played an important role in the trade with a natural entrance from Kori creek where another Harappan site, Lakhpat was located. It is widely accepted that around 5000 years BP, the now submerged Rann was more than 10 m deep which might provide the Harappans a natural excellent basin with an ideal water column required for harbouring their ships that operated both in river waters and high seas and it is possible that till 1700 BCE. Rann was navigable (IAR 1991-92; IAR 1993- 94; Bisht 1989a: 397-408, 1989b:265-72, 1991: 71-82, 1994, 1998-99:14-37, Gaur 2000: 47-8; Rajesh et.al. 2013: 10-45).

Surkotada (23°37'N; 70°50'E), Dist. Kachchh

Surkotada is situated 50 km north of Kanthkot was excavated by Joshi of the Archaeological Survey of India, to know the cultural sequence of the site, to locate the cemetery and to study the subsistence patterns of the Harappans in Kachchh. The excavator has distinguished three sub periods, namely IA, IB and IC.

During IA, the Harappans built a fortified citadel and residential annexes made of mud brick, mud lumps and rubble, containing houses with bath rooms and drains. They had ceramics like red ware, polytone cream slipped red ware, polychrome red ware, black painted red slipped ware, reserve slipped ware, deep red burnt-amber slipped red ware, coarse red ware along with the terracotta toy cart frames, wheels, gamesman, hop scotch, marbles, cylindrical and conical objects (Linga), cakes, spindle whorl, spools, engraver, gratings, net sinkers, bangles; beads of terracotta, agate, lapis lazuli, carnelian, shell, steatite, chert and bone, shell bangles, engraver, and scale pan; copper objects like bangle, rings, arrow heads, pins, needles, lance or spear head, antimony rods, beads and some pieces and lumps, stone objects like chert blades, knife of razor, saw edged blades, sickle and poker like blades, querns, sling balls, mace head, whet

stone, muller, skin rubber, ivory objects like kohl sticks, stylus and bone polisher and tools like points, burin, borer or awl, scrapper, piercers and engraver and a steatite seal. Along with the Harappans, there was also a non-Harappan population whose pottery though limitedly found, shows affinities with that of Ur, Brak and T.Jitle in West Asia. The faunal remains recorded are humped cattle *(Bos indicus)*, goat *(Capra hircus)*, sheep *(Ovis vignei)*, chital *(Axis axis)*, pig *(Sus scrofa)*, Indian rat *(Rattus rattus)*, jackal *(Canis aureus)*, dog *(Canis familaris)*, horse *(Equus caballus)*, ass *(Equus asinus and Equus hemionus)*, fish *(craps and Rita rita)*, river turtle *(Chitra indica)* and fowl *(Gallus gallus*) along with Cypraeidae, Xancidae and Turritellidae.

During the IB, a revetment was added to the fortification, besides house walls. This phase marks a new element in the population, along with the already extant Harappan, who use coarse red pottery. The artefacts noticed are terracotta animal figurine, toy cart frames, wheels, gamesman, hop scotch, marbles, cylindrical and conical objects, cakes, clay balls, spindle whorl, spools, engraver, gratings, bangles, beads of sandstone, jasper, faience, terracotta, agate, lapis lazuli, carnelian, shell, steatite, paste; shell bangles, pendants, button and scale pan; copper objects like bangles, rings, celts, arrow heads, pins and some pieces and lumps; stone objects like jasper gamesman, chert blades, querns, sling balls, marbles, sharpener, weights (jasper and granite), whet stone, muller and skin rubber; ivory objects like kohl sticks and stylus, bone polisher and tools like points, burin, borer or awl, piercers, engraver and digging tool. The faunal remains recovered are humped cattle *(Bos indicus)*, goat *(Capra hircus)*, sheep *(Ovis vignei)*, chital *(Axis axis)*, pig *(Sus scrofa)*, Indian mongoose *(Herpestes auropunctatus)*, Indian rat *(Rattus rattus),* wolf *(Canis lupus)*, dog *(Canis familiaris)*, horse *(Equus caballus)*, ass *(Equus hemionus and Equus asinus)*, humped camel *(Camelus dromedaries)*, fish (carps and Rita rita), river turtle *(Chitra indica)* and fowl *(Gallus gallus)* along with Buccinidae, Olividae, Xancidae, Turritellidae, Unionidae, Corbicidae and Pectinidae.

In the last phase, another set of people using the black-and-red ware and a greenish buff ware came to the site. The habitation in the form of fortified citadel with an impressive centrally placed gateway complex in the south was built and the residential annexes were fortified with a rampart wall having houses with lanes and by-lanes. The important finds are terracotta animal figurine, toycart frames, wheels, gamesman, hop scotch, marbles, votive tanks, cakes, spindle whorl, spools, gratings, tawa and bangles; beads of terracotta, sandstone, agate, lapis lazuli, carnelian, serpentine, shell, steatite, chalcedony and copper; shell bangles, rings, disc shape objects, pendant and cube, copper objects like bangles, rings, chisel, arrow heads, pins, chain, lance or spear head, blades, antimony rods, beads in hoard, fish hook, foil, knives / dagger, drill and some pieces and lumps, weights (chert, sandstone and steatite), stone objects like blades, cores and flakes, jasper gamesman, querns (saddle, legged, flat and circular), hop scotch, whet stone, marbles, muller, skin rubber and games board, ivory objects like pendants, kohl sticks, stylus and combs, bone polisher and tools like spear head, points, burnishers, burin, borer or awl, scrapper, piercers, spatula, engraver and digging tool and a typical terracotta seal. The faunal records are humped cattle *(Bos indicus)*, goat *(Capra hircus)*, sheep *(Ovis vignei),* chital *(Axis axis)*, pig *(Sus scrofa)*, desert snake, the shrew, Indian rat *(Rattus rattus)*, jackal *(Canis aureus)*, dog *(Canis familiaris)*, horse *(Equus caballus)*, ass *(Equus hemionus and Equus asinus)*, rhinocerous *(Rhinocerous unicornis)*, humped camel *(Camelus dromedaries)*,

rabbit *(Lepus nigricollis)*, Indian black naped hare *(Lepus nigricollis Cus)*, Elephant *(Elaphus maximus)*, fish *(carps and Rita rita)*, river turtle *(Chitra indica)* and fowl *(Gallus gallus)* along with Cypraeidae, Xancidae, Clausilidae, Zonilidae, Turritellidae, Pramidellidae, Unionidae and Pectinidae.

The palaeo-botanical remains represent fox-tail millet *(Setaria italic)* and finger millet *(Eleusine caracana)*. The grasses noticed are *Andropogen*, *Arundirella metzii* (H), *Arundinella pumpilla* (H), *Brachiaria reptans* (L), *Dichanthium* sp., *Eragrostis* sp., *Digitaria* sp., *Echinochloa stagnina* (R), *Setaria virdis* (L), *Panicum* sp., and *Phyrgmites karka* (R). The sedges are *Carex* spp., *Cyperus rotundus* L., *Cyperus micheleanus*, Eriophorum sp., *Fimbristylis ovat*e K., *Scirpus lateriflorus* C., *Scirpus litoralis* S and other wild species like *Amaranthus* sp., *Atriplex* spp., *Euphorbia* spp., *Heliotropium bacciferum* F., *Mazus pumillus* S., Stellaria sp., *Zaleya decandra* L. and *Trifolium repens* L.

The cemetery was noticed 300 m away from the habitation and on the north-west at a slightly elevated region. This terrain is rocky with small hillocks where the Harappans buried their dead in the form of exclusive pot burial, post exposure along with pottery and post-cremation burial along with pottery. These oval pits are laminated by five flat stones along with jars, vase, bowl, dish, conical flask and dish on stand and covering it with huge slab along with cairns on the top was unprecedented in the Harappan burial tradition. These burials belong to period IA.

Overall, the excavation has revealed that the Harappans lived here along with an antecedent culture in period IA with all their typical mode of habitation and cultural assemblage and continued even after the mature phase. The fortified citadel and residential complex of IA was maintained throughout their successive periods. At the end of Period IB, there was a huge conflagration but the Harappans and course red ware using people continued to live at the site. Other interesting finds are clay linga like objects, the evident of cult significance. A few varieties of wild animals show that the surrounding was not highly wooded and the presence of large number of rodent bones indicates the stable life and food habits of the people. Rodents usually appear where storing habit is seen. The discovery of an overwhelming majority of seeds of several plants species, including grasses, sedges and the other with a sprinkling of grains of two cultivars in a pot is highly suggestive of two facts viz., farming as well as gathering of seeds of wild plants. Further, many of the wild species identified do not occur in Kachchh, but are distributed in the southern and central Gujarat where the climate is moister. According to Soundararajan, 'this essentially a trade cum political or administrative outposts or garrisons of central Harappan authority and the reserve slipped ware found here is essentially a traders residue of its resident users in operational movements to and fro' The radiocarbon dates for the site has revealed the time bracket from BCE 2886 to BCE 1600 (Joshi 1990; Possehl and Raval 1989; Soundararajan 1984:219; Rajesh et.al. 2013: 10-45).

Khirsara (23°50'N: 69°05'E), Dist. Kachchh

Khirsara is a small village situated at a distance of about seven km south of Ravapar on the Bhuj-Narayan Sarovar State Highway and five km north of Netra. The site was locally known as 'Gadhvadi' is two km east of the village and was surrounded by two seasonal streams on the

northern and southern side which drains into the river Khari flowing at a distance of around 400m away. The excavation by Nath of the Archaeological Survey of India from 2009 - 13 has yielded rich cultural debris belonging to the mature Harappan phase. This fortified settlement roughly trapezoid in shape measures 308.26m on the northern, 278.58m on the southern, 225.92m on the eastern and 232.74m on the western axis. The evidences show five structural phases and damaged caused by the flood in successive phases. The excavation on the peripheries of the massive fortification has revealed a double fortified wall plastered with mud, corner bastions and salient at regular intervals. A wall running parallel to the fortification on outer side was provided to protect the site from flood.

The excavations on the inner side of the northern fortification has revealed residential structures having interconnected rooms with entrances and door sills, pillar bases, chullahs, flooring with mud brick materials and street with rammed materials. On the south-eastern corner, an entrance was provided and was closed in the later phase. The guard rooms were provided on the either side of the passage with a flight of steps which lead to 'Ware House'. With a series of parallel walls in north-south orientation, built of roughly dressed stones over the rammed mud platform, measures 12m north-south and 28m east-west. These walls are supported with three intersecting walls at regular intervals. With an average distance of 0.70m to 0.85m in between the walls, the width of these walls varies from 1m to 1.50m. A rectangular platform abutting the parallel walls was provided at the northern end of this structure, which probably served as a working platform. The super structure of the 'Ware House' was probably made of perishable materials.

The excavation on the west of ware house has revealed the citadel raised over the bed rock within the general fortification. The wall made of mud bricks were provided with stone veneering. The northern side measures 87m while the southern side measures 90m. It shows evidences of alterations and additions in different phases. The total width of the wall is about 5m (north) and 10m (south) and the extant height is about 4.72m. The citadel also revealed the complexes with closed entrances, door sills, hearth, drain, flight of steps, post holes and a well.

Just opposite the northern face of citadel, remains of a 'factory site' was exposed with a 5m pathway in-between them. It covers an area of around 6, 600 sq. m. which was half of the citadel area. The excavations has revealed well planned complexes with spacious interconnected rooms, multifarious entrances, stone paved and plastered flooring, pillar bases, drains, water tank, series of storage jars, flight of steps, kilns, hearths, etc. Apart from the complexes with lanes and by-lanes, an interesting structure of this phase is a four-chambered room with inlet and outlets. It measures 7m × 3.5m and probably used as 'dyeing vat'. In the last phase, the whole area was re-laid or plastered with mud brick materials and they reused the stones of the early phases. Even the fortification wall was covered with mud brick materials and its actual use was ceased. The structures are of mostly single course without proper alignment. The rooms and floors with flat sandstones are the only evidences of this phase.

The surface cleaning along the eastern side of the outer fortification wall has revealed a series of kilns and two were exposed. The first one is circular on plan and has two chambers, one above the other. Its longer axis along the mouth, which was meant for supply of fuel had two

hallow compartments. The fire reaches the upper chamber through 15 flues, all of which are interconnected. The walls on both the sides are mud plastered. Due to firing to a high temperature, the walls are vitrified. Except stray potsherds and ashes, nothing was recovered from the inner chamber. It clearly indicates that most probably the objects were kept one above another on the top for baking. The evidences also shows that in the later stages, the use of the kiln was minimized in the form of raised inner wall in-between the longer axis and circular chamber and also in the form of few closed flues with flat stones on the outer surface. This kiln measures 3.80 m in diameter and 5.42 m in longer axis. The diameter of the flues ranges from measuring 0.10 m to 0.15 m. The second kiln is also rock- cut one and circular in shape. With a fuel chamber in front – all are open. The interior of this kiln also shows the evidences of firing at a high temperature. The diameter of the chamber is 2.20 m and the overall length is 3.60 m. The surface cleaning also shown that there was a series of kilns of various sizes. It is interesting to mention that these series of kilns, along with the above are secured by the second fortification wall. This wall measures 2.60 m in width. The reason for constructing the kilns outside the main fortification wall shows the safety measures adopted by the Harappans in preventing the fire hazard and secondly, the easy availability of raw materials from the nearby area. As the river is situated just near the site and the ground area is flat natural rock, which is ideal to keep ceramics when it is leather hard condition.

The ceramic assemblage of Khirsara consists of a vast variety in shape and surface treatment. On the basis of surface treatment, shapes, firing, fabric and decoration, the ceramics are of red ware, red slipped ware, coarse red ware, gritty red ware, grey ware, buff ware, reserved slipped ware, black slipped ware, coarse red ware, sand rusticated ware, black and red ware, etc. The reserved slipped ware in various combinations and the perforated pottery are the dominating feature at Khirsara. The ceramic assemblage also includes a good number of incised decoration, graffiti and appliqué designs and painted motifs, where paintings with geometric and naturalistic pattern is the most common. The site has also yielded almost all types of Harappan artefacts, which includes nine seals of various types and shapes.

The study of palaeo-botanical remains revealed the double-cropping strategy as indicated by charred remains. The botanical samples collected has revealed the presence of *Hordeum vulgare* (Barley), *Triticum aestivum* (Wheat), *Eleusine coracana* (Ragi-millet), *Sorghum bicolor* (Jowar-millet), *Macrotylom uniflorum* (Horse gram), *Linum usitatissimum* (Linseed), *Sesamum indicum* (Sesame), *Gossypium arbreum/herbaceum* (Cotton). Apart from these field-crops, a fraction of weeds and wild taxa have also been recorded. The analysis of the archaeo-zoological samples has revealed the presence of both domestic and wild species. The domestic species comprises of cattle *(Bos indicus)*, buffalo *(Bubalus bubalis)*, sheep *(Ovis aries)*, goat *(Capra hircus)*, dog *(Canis familiaris)*, domestic pig *(Sus domesticus)*, cat *(Felis catus)* and non-mammals like Indian Sawback turtle *(Kachuga tecta)*, conch *(Turninella pyrum)*, a crab species *(Scylla serrata)* and several varieties of fish. The wild species includes blue bull *(Boselaphus tragocamelus)*, wild pig *(Sus scrofa)*, spotted deer *(Axis axis)*, gazella *(Gazella bennetti)*, four-horned antelope *(Tetracerus quadricornis)*, hare *(Lepus nigricollis)*, Indian Elephant *(Elephas maximus)* and wolf *(Canis lupus)*. Apart from this, domestic fowl *(Gallus domesticus)* was also identified. Among the shell remains *Turbinella pyrum*, *Pugilina buchephala*, *Chicoreus ramosus*,

Meretrix meretrix, *Anadara* sp., *Thais* sp., *Crassostrea* sp., *Telescopium telescopium*, *Dentalium* sp., *Melania Striatella tuberculata*, *Cypraea* sp., *Architectonica* sp., *Natica* sp., *Nassarius* sp., *Mytilus* sp., *Conus figulinus Linn*, *Pinctada margaritifera Linn*, *Parreysia faridens*, *Erosaria* sp. and *Arca granosa Linn* were identified from the collections.

The charcoal sample collected from the Index trench in the Citadel has revealed cal BCE 2475 cal BCE 2286 and cal BCE 2503: cal BCE 2198.

Overall, the excavations have revealed that Khirsara was an important manufacturing hub in western Kachchh engaged in bead making, shell crafting and copper smelting meant for trading and most probably with the overseas people (Nath et.al. 2012a, 2012b, 2013, 2017; Pokharia 2012, Joglekar et.al, 2013).

Kuntasi (22°45'N: 70°36'E), Dist. Rajkot

Kuntasi is situated about four km north-east of Hajnali and 32 km north-west of Morvi on the right bank of river Phulki. The site is located about three km from the present village. The excavation has revealed a threefold sequence of cultures, viz., Mature Harappan, Late Harappan and Late Medieval, along with three structural phases. The first two (A and B) belong to period I, while the third (C) belongs to period II. With an entrance on the east, flanked by bastions, the site was fortified with two successive walls with angular salients at the river side. Inside, the houses were arranged along the cardinal direction with an open space in the centre. Most of these houses are devoid of any hearths or fire pits or ash or charcoal. Though, there was no lower town, a few houses were also noticed outside the fortification. These structures were raised both mud bricks and stone foundations and as well as stone rubble with mud mortar plastered with mud. The noteworthy feature is a very large stone platform measuring 20.30m x 3.80m, emanating from one of this house and running north-south. It has a semicircular projection in the middle tempting the excavators to identify it 'as a ritual structure'. Facing towards the central open quadrangle, this was probably used by the priest to address the congregation. The other structures noticed were a complex with multiple rooms and workshop complexes with several large narrow chambers consisting of kilns and a furnace, storage area, long platform along the western periphery for loading and unloading cargo and a ramp leading to the river and a watch tower. The ceramics like red ware, painted red ware, bichrome ware, buff ware, perforated ware, black on red ware, reserve slipped ware and coarse red and grey ware were noticed along with the antiquities in the form of terracotta toy cart frames, wheels, spindle whorls, hop scotches, animal figurines, lamp, bangles, dice, loom weight, ladle, crucible, sling balls, indeterminate objects of pot sherds and ear ornament, beads of carnelian, agate, feldspar, quartz, lapis lazuli, jasper, steatite, paste, faience, gold, shell, terracotta, dentalium shell, malachite and ivory, pendants of granite, shell, faience and terracotta, copper objects like blade, spacer, ring, spiral head, rod, pendant, fish hook, bangle, knife, dagger, spear head, chisel, nail and drill, bone objects like knife, point, chisel, arrow head and indeterminate decorated object, a square faience seal, stone objects like weights (chert, quartzite and basalt), ear stud (chert), quern, skin rubber, hammer stone, muller, sling balls, sharpener, blades, fluted cores and flakes. Another discovery was that of a small pot embedded in one of the rooms of a house containing thousands of steatite micro beads, some bangles and two spiral rings of copper.

The faunal remains revealed both domestic and wild species like dog *(Canis familiaris)*, horse *(Equus caballus)*, domestic ass *(Equus asinus)*, cattle *(Bos indicus)*, buffalo *(Bubalus bubalis)*, goat *(Capra aegagrus)*, sheep *(Ovis vignei)*, one humped camel *(Camelus dromedaries)*, pig *(Sus cristatus)*, hare *(Lepus nigricollis)*, onager *(Equus hemionus)*, *Equus sp.*, wild cattle *(Bos sp.)*, wild buffalo *(Bubalus arnee)*, blue bull *(Boselaphus tragocameleus)*, barasingha *(Cervus duvaucelli)*, black buck *(Antilope cervicapra)*, chinkara *(Gazella bennetti)*, sambar *(Cervus unicolor)*, hog deer *(Axis porcinus)*, barking deer *(Muntiacus muntjak)*, wild pig *(Sus scrofa)*, *Sus* sp., turtle / tortoise, fish and crab.

In the next period (1900 – 1700 BCE), a gradual deterioration in the settlement was noticed. They are mostly single / double room with single course. The important discovery is a small key shaped clay furnace and probably worked with bellows. It is used for fashioning copper artefacts and ornaments. Though the ceramics of early period continues, a new ceramic, i.e. the white painted black and red ware was noticed. The antiquities in the form of terracotta toy cart frames, wheels, spindle whorls, female figurines, spacer, sling balls and ear ornament, beads of carnelian, agate, gneiss, lapis lazuli, jasper, steatite, paste, galuconite, gold, shell, terracotta, dentalium shell and beryl, pendants of shell, agate (cowry shape) and terracotta, copper objects like ring, fish hook, spiral, rod, amulet, bangle, knife, dagger, spear head, chisel, axes, mirror, crescentic blade and antimony rod, lead piece, bone ear ornament, stone objects like weights, gamesman, quern, skin rubber, hammer stone, sling balls, sharpener, anvil, mace head and anchor stones were noticed.

The faunal remains recovered were of domestic ass *(Equus asinus)*, cattle *(Bos indicus)*, buffalo *(Bubalus bubalis)*, goat *(Capra aegagrus)*, sheep *(Ovis vignei)*, pig *(Sus cristatus)*, langur *(Presbytis entellus)*, jungle cat *(Felis chaus)*, wolf *(Canis lupus)*, hare *(Lepus nigricollis)*, onager *(Equus hemionus)*, *Equus* sp., rhinocerous *(Rhinocerous unicornis)*, wild cattle *(Bos sp.)*, blue bull *(Boselaphus tragocameleus)*, barasingha *(Cervus duvaucelli)*, black buck *(Antilope cervicapra)*, chinkara *(Gazella bennetti)*, chowsingha *(Tetracerus quadricornis)*, sambar *(Cervus unicolor)*, chital *(Axis axis)*, barking deer *(Muntiacus muntjak)*, wild pig *(Sus scrofa)*, *Sus* sp., peafowl *(Pavo cristatus)*, *crocodylus* sp., birds, turtle/tortoise, fish and crab.

The floral study revealed panicum millet *(Panicum cf. miliare Lamm.)*, panicoid grass *(Panicum sp. and Eragrostis sp.)*, Itallian millet *(Setaria cf. italic)*, wild setaria *(Setaria sp.)*, barley *(Hordeum cf. vulgare Linn.)*, wheat *(Tritium sp.)*, jobs tear *(Coix lachrymal jobi Linn.)*, chenopodiaceae *(Chenopodium sp.)*, purslane *(Portulaca cf. oleracea Linn.)*, Indian jujube *(Zizyphus jujube Lamk.)*, solanaceae *(Solanum sp.)*, trianthema *(Trianthema sp.)*, *cucurbitaceae (Cucumis sp.)*, *agrostemma* (Agrostemma sp.), *Euphorbiaceae* (tiny fruit), kodo millet *(Paspalum sp.)* and compositae *(Erodium ?)*. The large amount of shell debitages reveals varied species like *Babylonia spirata*, *Turbinell pyrum*, *Trachycaroium enode*, *Anadara rhombea*, *Periglypta puerperal*, *Puphia gallus*, *Acanthocardia lata*, *Cardites qatiquata*, *Semele cordiformis*, *Apolumetris edentula*, *Pelecyora excise*, *Chlamys thanquebaricus*, *Placuna place*nta, *Cantharus spiralis*, *Pinctada sp.*, *Erosaria lamarcki*, *Agaronia nebulosa*, *Polinices didyma, Thais carinifera*, *Lophiotomo sp.*, *Telescopium telescopium*, *Architectonia laevigata*, *Natica sp.*, *Nerita chamaeloen*, *Astraea semicostata*, *Cerithidae cingulata*, *Diodora funiculate*, *Turbo sp., Ellobium aurisjudae*, *Zootecus insularis*, *Lymnaea acuminate*, *Dentalium sp.*, *Pugilina buchephala, Ficus*

sp., Tibia sp., *Viviparus bengalenis, Melina striatell*a *tuberculata*, *Indoplanorbis exustus, Solen sp., Chicoreus ramosus*, *Tonna sp.*, *Cypraea sp.*, *Crassostrea sp.*, *Cryptozona semirugata*, *Murex sp.* and *Turritella sp*.

The charcoal sample collected from the site has revealed the cal BCE 2207: cal BCE 1875, cal BCE 2411: cal BCE 1691, cal BCE 2488: cal BCE 2025, cal BCE 2701: cal BCE 1870, cal BCE 2470: cal BCE 2267 and cal BCE 2579: cal BCE 2113.

Overall, the evidences from the excavations indicates that in the early phase, few structures are raised to store the raw materials acquired from the hinterland, later to be transported to Sindh for processing. In the late mature phase, Kuntasi was developed into an industrial centre and a port. The introduction of bajra and jowar towards the end of 3rd millennium and the absence of wheat and barley led the population to subsist on finger millet or ragi (Eleucine coracana), panicum and such other coarse grains. As such, meat of domestic and hunted animals and marine organism found a major element of their diet. The vast amount of complete shells and debitages, finished and unfinished shell objects indicates a well-developed shell industry at Kuntasi.

According to the excavators, 'Kuntasi was neither a metropolis not a city, not a town and we cannot even call it a village; we can at best call it an industrial establishment or an emporium (Dhavalikar et.al 1996; Possehl 2007: 309).

Lothal (22°31'N: 72°15'E), Dist. Ahmedabad

Lothal is situated between the river Sabarmati and Bhogava and three km north of Saragwala village. The excavation carried between 1955– 62 by Rao of the Archaeological Survey of India has revealed nearly 8m cultural deposit classified into Period A (2450 to 1900 BCE) and Period B (1900 to 1600 BCE) and further divided into five phases. The phase's I-IV falls in Period I and phase V in Period B. During the Phase I, the Harappans began to appear, but it was in Phase II that they laid out their township enclosed by town-wall with an entrance on the south. The citadel, rectangular in plan was surrounded by a wall made of mud, at places reinforced with mud bricks and rarely with kiln-fired bricks. Though, there is no separate wall around the citadel, it maintained the identity due to its location on a high mud brick platform and also special structures thereon.

Oriented along the cardinal directions, the houses lay in blocks were separated by streets and lanes, with underground drains constructed with kiln-fired bricks. Phase III appears to have been the most prosperous one. Some of the houses during this phase were larger and consisted of four to six rooms, spacious courtyard and verandahs with baths paved with kiln-fired bricks. The remains of fire-altars and evidences of craft activities in the form of crucibles and raw materials were found in some of these houses. The excavator identified one of the streets as the bazaar having shops on both sides. The lower town provided accommodations for craftsmen-coppersmiths, goldsmiths, shell workers and bead makers and their shops and working places are marked by the remains of craft.

A ware house was found located south of the citadel and west of the dock. It was built on a 4m high podium, covering an area of 48.75m × 41.15m with an earthen ramp for an approach

from the dock on the east and the fields on the south. Originally, 64 blocks must have stood on the entire podium but now only 12 were traced on the north-western direction. Overlying the habitation debris of period I comprising of silt, clay, potsherds and bone fragments and rammed kankar, each of the 12 blocks was originally 3.65m on plan and 0.9m high but flood in phase III and IV damaged along with main platform. The access being provided by the earthen ramps running along the west and north margins perhaps the peripheral platform on the south and the wharf on the east were used as loading platform. The brick paved channels served as passages. The evidence of huge fire that destroyed the ware house was noticed in the form of large quantities of ash and hundreds of sealed lumps of burnt clay bearing marks of reed in the channels. The sides of the cubical blocks have turned red owing to contact with fire. The mud plaster on the walls was found to contain rich husk. At the northern end of each passage, drain like grooves of burnt bricks with 0.07m wide were noticed, but they do not run continuously. They were meant for sliding shutters to close the passages and served as air-vent. Free movement of labours and easy hauling of goods were rendered possible on account of these passages. The mud brick bases have a roof of some perishable material over them. After IIIB, the structure ceased to serve the original purpose, most of the bases and the entire timber work seems to have been destroyed by flood along with dock in phase IIIC. The brick-paved floors and a drain built in later phase suggests the use of ware house for a different purpose and was completely abandoned in Phase V. To the east of the township, there is a trapezoidal basin enclosed by walls of kiln-fired bricks. The west and east walls of this basin measures 218 m and 212 m in length, while the north and south measures 37 m and 35 m with a 12 m and 7 m wide inlet and outlet on the north and south. Rao opines that 'the basin functioned as dock where some anchor stones were recovered inside the dock as well as the wharf area'. This being the earliest example of constructing an artificial enclosure for handling cargo and berthing ships; it presupposes a sound knowledge of hydrography and maritime engineering of those days.

In the west, a cemetery was found, between the peripheral wall and the river where most of the burials were in the usual Harappan style and three contained two skeletons each. Following a flood in phase IV, the dock was rebuilt with walls of reduced thickness and due to the chocking up of the original flow channel, a new and narrow channel of the river was excavated. The final destruction of the dock yard took place with a flood that ended the prosperity of the settlement. In phase V, there were no town planning; the inhabitants had built houses with mud floors, reed walls and thatched roofs. The long Rohri chert blades gave place to shorter blades of locally available stones and the ceramics also underwent changes. In addition to the micacious red ware and black-and-red ware, red ware, buff slipped ware, buff ware, green ware, grey ware, coarse red ware, coarse grey ware, red slipped ware, prabhas ware, incised ware were also noticed. Apart from the seals and sealings, almost all the types of antiquities of all the materials were noticed (Rao 1979, 1985).

The varied floral remains recovered during phase II (2350 – 2200 BCE) includes Acacia sp., Albizzia sp., Adina cordifolia, Tectona grandis, Lauraceous wood and Oryza sp. while in phase III (2200 – 2000 BCE), *Acacia sp., Albizzia sp., Adina cordifolia* and *Soymida febrifuga* whereas in phase IV (2000 – 1900 BCE), Millet and Monocot (*Gramineae* ?). The faunal remains includes acarp fish, fresh water fish *(Rita rita),* the river turtle *(Chitra indica),* soft-shelled

box turtle *(Lissemys punctata)*, fowl *(Gallus sp.)*, domestic dog *(Canis familiaris)*, jackal *(Canis aureus),* mongoose *(Herpestes auropunctatus),* elephant *(Elephas maximus),* horse *(Equus caballus),* one-horned rhinoceros *(Rhinoceros unicornis),* domestic pig *(Sus scrofa),* barking deer *(Muntiacus mumtzak),* spotted deer *(Axis axis),* sambar *(Cervus unicolor),* barasingha *(Cervus durauceli),* black buck *(Antelope cervicapra)*, blue bull *(Boselaphus tragocamelus)*, bison *(Bos gaurus)*, Indian buffalo *(Bubalus bubalis)*, humped cattle *(Bos indicus)*, goat *(Capra hircus),* sheep *(Ovis vignei),* hare *(Lepus nigricollis)* and house rat *(Rattus rattus)*and shell remains likes *Viviparus bengalensis*, *Pila globosa*, *Telescopium telescopium*, *Olivia ispidula*, *Xancu pyrum* and *Conus* (Rhizoconus) *rattus*. The chemical analysis of copper objects revealed a high degree of purity (99.8%) and shows no arsenic and deliberate use of tin in high percentage. The technique employed were casting and hammering, i.e. the forging technique. As far as gold pendants are concerned, the alloy of gold and silver are not prepared separately but most probably native alloy, electrum was used for making the pendants.

The cemetery on the western edge of the mound, revealed graves, with pit lines, while a few contained fragmentary bones and potsherds. Extended burial was the common practice oriented north-south, with the head towards the north, with arms pressed together, and the body laid in a supine position, legs slightly flexed and feet touching. Evidences shows that rituals were performed before placing the body. Burial goods consist of earthenware vessels, ornaments such as copper ear rings and rings, shell bangles, chank shell and terracotta bangles and beads. One notable grave contained a joint burial of two adult males with familial resemblance, lined with mud bricks. Furthermore, animal remains, such as the teeth of Bos indicus and sheep horns, suggest that animals were either sacrificed or offered to the dead. The rituals, grave goods and animal remains offer insights into the burial practices and rituals of the Harappan civilization at Lothal.

According to the excavator, 'Lothal made a substantial contribution to enrich the Harappan Civilization in scientific and technical fields. It is now established that the Lothal engineers were pioneers in constructing an artificial dock for berthing ships. Nowhere else in the world had maritime engineering advanced so much in the third millennium BCE as at Lothal. It is again the surgeons of Lothal who could trephine the skull, perhaps with a view to operate on the brain. They invented a scientific instrument comparable to a modern compass for measuring angles. Among other improved tools mention may be made of a circular saw, the twisted drill and the planer-bit produced for the benefit of carpenters, coppersmiths and shipwrights'. Overall, the evidences shows that after the great flood around 2000 BCE, the prosperity of the site begins to fade away and another flood around 1900 BCE sealed the fate of Lothal and ceased to be a port of any importance. With its economy shattered and trade brought to standstill, the inhabitants did make an effort to improve their economic condition. They made use of locally available materials and produced the required tools and evolved new traditions in ceramics. The floral and faunal remains show the varied one. The occurrence of Tectona grandis and Adina cordifolia along with Acacia and Albizzia suggests that both the forest vegetation and the climate in the Lothal region may have been different from the present.

This is further confirmed by the presence of rhinoceros bones from the collection which lives in humid and moist climate. Their occupation was mainly based on agriculture, collection of wild seeds, hunting, fishing and mostly importantly, domestication. The percentage of the bones of young animals and the cut marks clearly shows that they formed a main part of their dietary (Rao 1979, 1985).

Nageshwar (22°20'N: 69°03'E), Dist. Jamnagar

Nageshwar is situated 17 km north-east of Dwaraka and between the Pindara and Poshitra bays on the south coast of Gulf of Kachchh. The site is actually situated on the north and north-eastern side of a large perennial sweet water lake locally known as Bhimgaja Talav. The preliminary survey of the site led the excavators to believe that 'the entire site could be seen as flourishing marine shell working settlement of the Harappan period, from the shell fragments, plentifully distributed all over the site'. The restricted excavation has revealed 2.60m occupational deposit represented by a single period and based on ceramic typology, it was divided into phases A and B. During phase A, the habitational structures were noticed in the form of rammed mud floors, whereas in Phase B, two structural levels, marked by the introduction of well-built rectangular rubble structures of a house with carefully levelled thin flat pieces of calcareous sandstone with mud mortar rammed floor along with some rubble walls-part of a residential unit and a circular fire altar with a *pranala* like projection towards the south. The ceramics found both in exploration and excavation are red ware, chocolate slipped ware, cream slipped ware, polychrome ware, grey slipped ware, buff ware, coarse red ware, reserve slipped ware and *prabhas* ware. Shell objects like beads, bangles, inlays and ladles form the major bulk of antiquarian remains along with stone objects like fluted cores, trimmed flakes, blade flake, scrappers, burins, crested ridge flakes and typical long parallel sided chert blades, querns, mullers and pounders, weights, cylindrical stones, hammer stones, whet stones; terracotta objects like discs, spindle whorls, wheels, bangles, pellets, toy cart frames, dabber, cakes and pinched clay lumps; beads of carnelian, faience, steatite, dentalium, terracotta; copper objects like fish hook, needle and folded thin sheets etc.

The faunal remains revealed cattle *(Bos indicus)*, buffalo *(Bubalus bubalis)*, sheep *(Ovis aries)*, goat *(Capra hirus)*, pig *(Sus scrofa)*, dog *(Canis familiaris)*, chital *(Axis axis)*, Sambar *(Cervus unicolor)*, black buck *(Antilope cervicapra)*, hare *(Lepus nigricolis)*, blue bull *(Boselaphus tragocamelus)*, chinkara *(Gazelle gazelle)*, turtle *(Lissemys punchtate)*, mole rat *(Bandicotta bengalensis)*, house rat *(Rattus rattus)*, monitor lizard *(Varanus sp.)*, wild pig *(Sus scrofa)*, crab, lobster and fish along with *Turbinella pyrum*, *Chicoreus ramosus* and *Fasciolaria trapezium*.

The carbon dating from the site reveals BCE 1952: cal BCE 1863, BCE 2033: cal BCE 1737, cal BCE 2310: cal BCE 2137, cal BCE 2411: cal BCE 2121.

According to the excavators, 'Nageshwar appears to have been inhabited by Harappan colonizers from Sind during the mature Harappan phase and exploited the unlimited marine resources. The surplus goods thus produced were probably traded to regional and inter-regional markets

along well established trade and exchange network'. Along with the limited agriculture, the people of Nageshwar practiced stock raising, hunting, trapping and fishing (Hegde et.al 1990).

Padri (21°22'N: 72°06'E), Dist. Bhavnagar

Padri is situated eight km west of Talaja and close to the Gulf of Cambay was 50 km south of Bhavnagar. The site, locally known as Kerala-ne-Dhoro was situated two km south of the present village. River Shetrunji flows near the site. Excavations by Shinde of the Deccan College has revealed 3 cultural periods, viz., the Pre-Harappan Padri Culture, the Mature Harappan and the Early Historic. The habitational deposit of the Period I was noticed in the form of structural complex of different structural phases. This complex of varied functions reveals platforms for storage bins and kitchens with well-rammed floors. The other structures were the one with well-made floor and postholes on the western periphery used for bead making and another one seems to be a house. These structures were made out of mud walls and mud bricks of 1:2:4 ratios and datable to 3600 BCE to 3300 BCE. The antiquities recovered are beads of semi-precious stones and steatite; copper fish hooks, chisel, razor, saddle querns, grinding stones and potsherd engraved with Harappan signs. The faunal remains recovered are cattle *(Bos indicus)*, goat *(Capra hircus)*, sheep *(Ovis aries)*, water buffalo *(Bubalus bubalis)* and rat *(Rattus rattus)*.

The structural activity of Period II was noticed in the form of rectangular houses with plastered-floor and postholes similar to that of Deccan chalcoliths. Further two kilns, one of apsidal and another of circular in plan were noticed, both are plastered with thick mud wall and the inner is lined with thick coating of kankar and sand, while the first one yielded number of clay stumps with arches. The materials used in the structures were mud, mud-brick and burnt-bricks and were datable to 2500 BCE. The ceramics like padri ware1, red ware, buff ware, sturdy red ware, white lustrous ware and bichrome ware were noticed along with the terracotta discs, spindle whorls, shell bangles and beads; a button shaped inscribed seal with fish motif made on a broken stud handle.

The faunal remains of this period includes cattle *(Bos indicus)*, goat *(Capra hircus)*, sheep *(Ovis aries)*, black buck *(Antilope cervicapra)*, chowsingha *(Tertacerus quadricornis)*, chital *(Axis axis)*,chital / dee*r (Axis sp. / Cervid)*, blue bull *(Bosellaphas tragocamelus)*, water buffalo *(Bubalus bubalis)*, bandicoot *(Bandicota indica)*, dog *(Canis familiaris)*, wolf (Canis lupus), jungle cat (Felis chaus), grey mongoose *(Herpestes edwardsi)*, hare *(Lepus nigricollis)*, pig *(Sus domesticus)*, wild boar *(Sus scrofa)* and monitor lizard *(Varanus bengalensis)*. The radio carbon dating of the site form cal BCE 3705 to cal BCE 1749.

Overall, the excavator opines that, 'Padri appears to be rural in character and does not seem to be fortified and was major production of salt'. The test pits also revealed that the back water of sea was exploited for salt farming by the Harappans (IAR 1990-91: 8-10; 1991-92: 21-22; 1993-94:34-38; 1995-96: 11-12; Shinde 1994: 481-485; Walimbe and Shinde 1995:43-50; Possehl 2007: 309; Sarvankar 2012; Rajesh et.al. 2013:10-45).

Physiography of Ghaggar - Hakra Valley

Ghaggar, believed to be the ancient Sarasvati, originates in the Sirmur district of the Himachal Pradesh and enters Haryana near village Bariser, where it takes a sudden curve towards south and cut across the northern ridge of the Morni hills. After flowing a few kilometres, it again takes a sharp turn towards the north-west. Here it follows through a deep gorge about ten km, near village Thapli Sikh, a tributary name Budhi-Ghaggar joins it. It enters the plains near Panchkula. In the upper courses, it contains water throughout the year, but lower courses it is generally dry in the summer. It carries huge amount of water during the rainy seasons. A lot of rivulets, hill torrents feed the river. There are two major areas of its catchment in its upper reaches one is Binjor doon and another one is foot-hills zones (Misra 1967).

The Ghaggar, more or less forms the boundary of Punjab and Haryana states. Passing through Haryana and Punjab, it enters Hanumangarh district of Rajasthan and a few km west of Anupgarh (district Sri Ganagnagar); it enters the present day Pakistan, where it is known as Hakra, The Ghaggar seems to have been a mighty in the past as indicated by some dry beds 2 - 3 km wide along. A large number of archaeological settlements can be supporting this viewpoint.

Important Excavated Sites in Ghaggar valley

Baror (29° 10' N; 73° 16' E), Dist. Sriganganagar

Baror is situated on the right bank of dried up river Sarasvasti (modern Ghaggar) is about 100 km south-west of Kalibangan, Rajasthan was excavated by ASI during the year 2003-06, revealed three cultural sequence viz, Pre-harappan, Harappan and Mature Harappan.

The period I is distinguished by the ashy bands with some post-holes indicate that the first settlers used to live in huts made of wattle and daub or thatched roof with a different type of ceramic industry dominated by red to dull red pottery, grey ware and devoid of any painting but made out of well-levigated clay. The main shapes are storage jar, handi and miniature pots. Period II is marked with the beautiful bi-chrome pottery made out of well-levigated clay. The surface of these potsherds are red to dull red in colour on which paintings were done with black colour, then with the help of evanescent white pigment the gaps were filled and additional dashes and dots were added. The main shapes are vase, basin, bowl, dishes-on-stand, lid etc. Period III is represented a well-planned city surrounded by a fortification wall. The remains of mud bricks house complexes oriented in the cardinal direction, either north-south or east-west on both sides of lane and sub-lanes with periodical repairs and reconstructions. Several circular or oval hearths or ovens were also exposed. A big, almost circular, furnace or kiln measuring 2.6m in diameter and 8.12m in circumference with 1.10m long projected mouth. The pottery of this period is marked by Red ware and Red slipped ware and characterized by its typical painted design with black pigment. The main shapes are dishes-on-stand, basin, dishes, beakers, vases, goblets and perforated jar etc. The other material culture includes beads of semi-precious stones, shells, steatite, faience and terracotta; bangles of copper, terracotta and shell; rings of copper and gold, implements of bone and stone, fish hooks of copper, pestle and querns of

stone, human and animal figurines, toy carts, wheels and games men of terracotta, shell and steatite seals depicting unicorn and geometric design were also found.

Binjor (29°12' 25" N; 73°09'33"E), Dist. Sriganganagar

Binjor is located on the left bank of the Ghaggar river is around 110 km west of Kalibangan, Rajasthan. It was excavated by ASI from 2014 to 2017, which revealed three cultural sequences, viz., Pre / Early Harappan, Transitional Period (Early to Mature Harappan) and Mature Harappan (Manjul S.K. 2016)

The period I is divided into two phases. During phase I (pre-harappan), the pottery is made on slow-wheel comprising red to dull red in colour, with fine to medium fabric by its typical painted design of monochrome and bichrome, similar to Kalibangan pre-harappan pottery. Some stray example of black horizontal bands was notice on the rim made of well-levigated clay. Since the remains of the period were found in a very limited area, no structures has been found. The phase-II (early harappan) is marked by the presence of potsherds made on fast-rotating, wheel. The surface is red to dull in colour, on which painting were done with black and white colour. The painted design comprises horizontal bands loops wave line and concentric arches. The main shapes are vase, basin, bowl, dish-on-stand, etc. Three structural phases were noticed in the form of circular hearth with mud bricks (40 x 18 x 9 cm) structure with fortification wall. The houses are oriented roughly north-south and east-west where the mud bricks are placed in regular courses of headers and stretchers with mud-plaster and the floors are rammed with clay. Several hearths either circular or oval filled with ash and charcoal was exposed. An important find of this phase is a steatite pendent seal. The evidence of 1.5m deposit if flood revealed that the site was destroyed by a flood during this phase.

Period II is a transitional period from early to mature harappan which is noticed in the form of abundance of polychrome paintings and increase of gobbler and goblet pots. Structures are noticed in the form of mud brick (30 x 15 x 7 cm) wall associated with floor and hearths in a row in east-west orientation where the hearths contains terracotta cakes and *mushitika* of different shapes.

Period III is identified as mature harappan where the ceramic assemblages are marked by red ware, red slipped ware and characterized by its typical painted design with black The paintings (pipal leaf motifs, etc).are done on carefully prepared red ground. Fairly good number of postholes was encountered along with several hearths. The shapes of the latter are either circular or oval or *yoni* and filled with ash, charcoal, potsherds and terracotta cakes and *mushitika*. Earthen pots are also found in situ in some of the hearths. The *yoni* shaped hearths were built with the bricks. Inter connected furnace used for smelting or preparing copper objects was also noticed. Nearly twenty structures, built by mud bricks measuring 28 x 14 x 7cm, 30 x 15 x 7.5cm and 32 x 16 x 8cm and were plastered with mud. The structures are oriented north-south and east-west from one to five courses. The bricks are laid in English bond. An interesting find is a tank built by burnt wedge bricks.

A numbers of antiquities were retrieved from the excavation. Terracotta objects include amulet, human, animal figurine, feeding bowl, sling ball, bangle pieces, beads, crucible, disc, ear-stud,

gamesmen, hopscotch, pendants, disc, rattle, ring, seal, spacer, spindle whorl, spinner, spool, toy cart frames, wheels, and weights. Stone objects include ball, beads, blade, hopscotch, lithic debitages, polished object, ring, sling ball, and weight. Copper objects are antimony rod, arrow head, bangle pieces, beads, chisel, fish hooks, copper piece, nail, ring, spacer, spear head, spiral ring and pointed tool with decorated foil of gold. Shell objects include bangle pieces, beads, disc and ring. The beads are of steatite, bone, faience, agate, carnelian, gold, jasper, serpentine, lapis lazuli, quartz, chert, amazonite etc. A remarkable finds includes rectangular steatite seal having both side engraved animal figurines and terracotta seal with Indus script on the obverse and small knob on the reverse. The AMS dating suggest that around 2000 BCE, the people deserted the site.

Kalibangan, (29°28'60.0"N 74°07'60.0"E) Dist. Hanumangarh

Kalibangan is situated on the left bank of the Ghaggar (ancient R.Sarasvati), Rajasthan. The site was excavated for nine field seasons (1960-1969) by the Archaeological Survey of India. The ancient site consists of three mounds and the excavation have revealed two periods of occupation viz, Period-1 early harappan, datable to 3000-2770 BCE and period-II mature Harappan datable to 2600-2000 BCE (Lal 2003).

During period-I, the settlement of Kalibangan I was fortified from the beginning of the occupation. The fortification was made of mud bricks and within the walled area, the houses were built of mud bricks of the same size as used in the fortification wall; the use of baked bricks is attested by a drain within the houses, remains of ovens and cylindrical pits, lined with lime plaster. The distinctive trait of this Period is, the pottery, first identified at Sothi, which is characterized by six fabrics, labelled A, B, C, D, E and F. Of these Fabrics, E and F distinguished essentially by surface colour (E by buff and F by grey). Among the other finds of this period are blades of chalcedony and agate, sometimes serrated or backed; beads, variously of steatite, shell, carnelian, terracotta and copper; bangles of copper, shell and terracotta; terracotta objects like toy-cart wheel and a bull; quem with mullers, a bone point, and copper celts, including an unusual axe.

During the period-II, the settlement was in two parts - the citadel on the west, located atop the abandoned settlement of period I, and the lower town (KLB-2) towards the east, laid out on the natural plain, leaving a gap of about 40 m. The citadel complex was roughly a parallelogram and consisted of two almost equal but separately patterned parts. Both these parts were contained by a fortification wall, and the enclosed area contained some five to six massive platforms of mud bricks, each separate from the other and perhaps intended for a specific purpose by the community as a whole. The lower city was also a parallelogram enclosed by a fortification wall, involving three to four structural phases. It was made of mud bricks of similar sizes as those used for the fortifications of the citadel (40 x 20 x 10 and 30 x 15 x 7.5 cm). Within the walled city was a gridiron plan of streets running north-south and east-west, dividing the area into blocks. The use of baked bricks are confined to wells, drains, bathing platforms, door-sills, etc.

Besides the above two principle parts of the metropolis, there was also a third one – a moderate structure situated upwards of 8o m east of the lower town containing four to five fire altars.

This lonely structure may perhaps have been used for ritual purposes. The finds of this period are all characteristic of the Harappa civilization significant amongst which is a cylindrical seals, however, noteworthy that the pottery of Period I continues alongside the Harappa pottery up to about half the height of KLB-2 where after it entirely gives way to the Harappa.

The pottery from the early phase of Kalibangan features numerous pre-firing and post-firing symbols that offer insights into Harappan culture. Pre-firing symbols include arrows, intersecting lines, twigs, swastikas, and various geometric designs. Post-firing symbols include similar geometric and figurative marks.

The excavations have uncovered a diverse range of artefacts, which include terracotta objects such as hour-glasses, scales, plumb-bobs, spindle whorls, pulleys, tiles, pipes, and figurines. Shell artefacts like ladles, bangles and ear rings, buttons, pendants, and inlays were also discovered, along with weights made of chert, agate, black jasper, and sandstone, and a variety of terracotta gamesmen and toy carts. Faience artefacts include complete and fragmentary bangles, a bud-shaped plumb-bob, and an ear ornament, Copper items such as chisels, nails, spearheads, knives, blades, wires, antimony rods, awls, mirrors, and a unique bull figure highlight the technological prowess of the civilization. Additionally, gold artefacts, including beads, ear and nose ornaments, inlays, buttons, foil, spacers, and pendants, reflect the use of precious metals in adornment.

The cemetery, located about 300 meters west-southwest of the habitation area near the Ghaggar River floodplain, revealed three types of burials viz., extended inhumation in rectangular or oval pot burial in a circular pit; and rectangular or oval grave-pit, containing only pottery and other funerary objects. The latter two methods were devoid of skeletal remains. This cemetery was methodically organized with separate areas for each burial type, and within the extended inhumation section, sub-areas were identified, possibly designated for family groups. Cemetery uncovered a variety of artefacts made from diverse materials.

The excavation yielded 63 seals in different kinds of material like steatite, terracotta, copper and bronze. The site yielded evidence of more number of crafts activity viz, agriculture, house building, carpentry, cobblery, ivory and bone crafting, bead making, lithic tool industry, shell industry and weaving activity (Lal 2003).

Karanpura (29°06'19.4"N 75°05'47.3"E), Dist. Hanumangarh

Karanpura is located on Nohar-Bhadra road, eight km from Bhadra and 120 km west of Kalibangan, Rajasthan. The excavation by Archaeological Survey of India under Prabhakar revealed many mud brick houses from early Harappan (3300-2600 BCE) to mature Harappan (2600-1900 BCE) periods along with pottery, terracotta bangles, grinding stone fragments, beads of agate, and a terracotta figurine. A copper mirror was also found at the site, a rarity in Harappan culture, but more evidence of their extensive trading. Pottery preceding Harappan culture has also been found within the site. Continuous findings within the site for up to 3 meters suggest a continuous occupation roughly since 2800 BCE. Early Harappan findings of copper and lapis lazuli reinforce the long-standing acquisition and trade of raw material sup to the mature Harappan period. Steatite seals and an abundance of graffiti was also discovered

within the mature Harappan portion of the site. Within the site, a rare discovery of 4 complete rhino bones was found, suggesting that the surrounding area was inhabitable with rhino. Despite being small in size compared to other Harappan sites, the ancient city was a major long-distance trading hub (Prabhakar 2014).

Rakhigarhi (29°17'42.2"N 76°06'55.0"E), Dist. Hissar

Rakhigarhi is a major archaeological site located in the Ghaggar-Hakra River plain of Haryana approximately 150 km north-west of Delhi. Spanning 224 hectares, it is recognized as one of the largest and oldest cities of the Indus Valley Civilization. The site encompasses Early, Mature, and Late phases of this civilization, dating back to 2800–1900 BCE, and comprises five interconnected mounds. The excavations by ASI from 1997 to 2000 the Deccan College from 2012 to 2016 and 2021 to 2024 by ASI have revealed new insights into this ancient Harappan city.

The excavations at the site revealed it was occupied during the Early Harappan times. Evidence of paved roads, drainage system, large rainwater collection, a public granary made up of mud-bricks with a floor of rammed earth plastered with mud and has 7 rectangular or square chambers. The evidences of lime and decomposed grass on the lower portion indicate that it was also be the storehouse of grains with lime used as insecticide and grass used to prevent entry of moisture.

The ceramics are similar to Kalibangan and Banawali. Sherds of Barbotine and cut ware are also noticed. The artefacts are variety of metal objects, primarily made of copper. The early harappan levels yielded arrowheads, chisels, styluses, needles, bangles, and spiral rings, while the mature harappan period, additional items such as knives, nails, fish hooks, balance bars, pins, and antimony rods were found, alongside ornaments like gold fillets and silver bangles.

The excavations also revealed a significant array of shell objects, showcasing advanced craftsmanship despite the site's inland location and indicates local production. Ivory objects, includes intricately carved combs and a dagger handle, a square dice, a bead, a spatula, a cubical weight, bangles, and cut pieces. Bone implements include arrowheads, awls, needles, styluses, spatulas, antimony rods, engravers, and bone points. Additionally, polished bone tools of various lengths, notched chert blades, sandstone polishers, and flat bone pieces were found. The site also revealed bone dice, balance sticks, spearheads, amulets, and rods. The diverse array of beads crafted from various materials, including steatite, faience, agate, carnelian, jasper, quartz, lapis lazuli, sodalite, turquoise, hornblende, paste, shell, bone, ivory, terracotta, and metal of gold and copper along with various spacers and pendants.. The intricately etched carnelian beads display the patterns like the "Eye pattern" and "Eight figured pattern," among others. The discovery of both finished and unfinished beads, along with manufacturing debris and tools, suggests that Rakhigarhi was a significant center for bead production, reflecting a well-developed trade network and advanced craftsmanship.

The burials showcases funerary practices similar to those at Kalibangan and Farmana. The findings included primary burials, cremations, and the use of cinerary urns. Often, brick covered grave pits had wooden coffins in one case. Different types of burial pits were undercut

to form an earthen overhang and body was placed below this; and then the top of the grave was filled with bricks to form a roof structure over the grave. The dead are placed in north-south orientation with head facing north with pottery of everyday use where some with grains of food. The grave goods includes steatite micro beads and gold beads, miniature gold fillet-shaped ornaments and shell bangles. The three female skeletons have shell bangles on their left wrists. Near one female skeleton, a gold armlet has been found. In addition, semi-precious stones have been found lying near the head, suggesting that they were part of some sort of necklace. The burial customs indicated social stratification, with distinct differences in grave goods. These findings highlight the significance of Rakhigarhi as an important Mature Harappan site, with unique burial practices and valuable grave goods.

The potsherds at the site have revealed various graffiti marks. These marks can be categorized into three main groups: potter's marks, artistic signs, and symbols resembling the Harappan script. The graffiti often appears as vertical, horizontal, and slanting strokes, sometimes forming complex patterns. Notably, 44% of the graffiti marks from the Early Harappan period and 70% from the Mature Harappan period show close similarity to the Harappan script. This indicates the evolution of writing from simple lines and strokes to more intricate composite signs over time. Graffiti marks found at Rakhigarhi were not limited to potsherds but also appeared on terracotta cakes, bone, beads, and metal pieces. Terracotta cakes with graffiti were typically well-fired and marked on one side. A lead piece displayed graffiti on both sides, possibly serving as a seal. Bone pieces and terracotta beads also bore graffiti similar to the Harappan script.

Continuity of Harappan Tradition

As mentioned above, the Harappan Civilization of the Indian Sub-continent flourished in different kinds of settlements. Many of them are tiny, covering a very small area, while a few of them are large settlements. In the heyday, they came into contact with other Chalcolithic cultures and these assimilations of cultural traits were noticed in the regional chalcolithic traditions.

These are sometimes noticed in the ceramic traditions in the Regional Chalcolithic Cultures / Traditions / Ceramic Types in Gujarat, like Anarta Tradition, Padri Ware / Padri culture, Pre-Prabhas Assemblage, Sorath Harappan, etc.

Continuity of Harappan Tradition in South India

The Harappans contact with South India has been already established from various sources. Although many scholars have dealt with the Harappan traditions that are closely followed in South India, this paper deals with the recent materials unearthed from both the sides that add some new features to the continuing Harappan tradition in South India.

Ceramics

Harappan potteries were known for their lavigated clay, well-fired and wheel-turned one. The typical Black and Red ware and other associated wares were more or less identical in both the areas. The tradition of Black on Red ware, Barbotine ware and Cut ware were no less important.

Black on Red ware was one of the important ware of the Harappans where the paintings on black being the famous loops, intersecting circles, triangles, Pipal leaf, peacocks and fishes. The same tradition of Black on Red ware with Pipal leaf and triangle designs were found on a pot and ring stand from the excavation at Senbaganur (Anglade:1937) and Thandikudi (Rajan & Adhiyaman:2011), both in Kodaikanal region and Alagapuri (Muthukumar: 2010) Sivaganga region, Tamil Nadu. The early Iron Age Pit burial with lipped basin, noticed in Thandigudi and Adichanallur, Tamil Nadu and Rock-cut-Chamber in Ummichpoyil, Kerala have unique of types ceramic during the 2nd Millennium BCE which have been observed across India.

Barbotine ware was found in most of the important Harappan sites used for storing medicines or expensive liquid items (Kumaran 2008). In South India, although the conventional technique remains the same, the knob design took a change and seems to be an indigenous one. These designs were particularly found from the sites like Hallur, Sanganakallu, Piklihal, Tekallakota, Birnur, Utnur etc. and these designs were found only on the jars intended for burials and also fashioned by hands. Further, Nagaraja Rao suggests that their use in burials represents the nipples of mother and inside may represent the womb. At Maski, it is a large melon bowl decorated with a fillet of raspberries outside the lip (Foote:1916).

Cut ware of Calciform cups, whose antiquity also dates back to Harappa was found in all the pit burials of the Kodaikanal region (Anglade: 1954) and also from the recent excavation at Thandikudi (Rajan:2006). The same was also found in cairn burials at Pochampad in Godavari basin of A.P. and also reported from Yeleswaram (Murthy: 2000). It is interesting to note that the potteries found from the burials of Harappan Civilization were fresh, and they are particularly meant for burials and the shapes like Dish on Stand, Ring base, Vessel with elongated body and flaring neck are found only in burials. The same tradition was also followed in the case of Neolithic, Chalcolithic and Megalithic burials of South India, where the potteries recovered from the burials were fresh and intended for those burials where those shapes were not in common use.

The fabric, finishing, clay and technology of the lipped bowl is very close to Harappans, which is very close to the ladle or lamp from Lothal, Shikarpur and even close with lustrous red ware of Sorath Harappans.

Beads

Beads from the time of Harappan Civilization were found abundantly, not only in quantity and shapes but also of varied materials. The Carnelian, Agate, Steatite etc., beads are yielded more than 50 excavated and explored Iron Age sites in Tamil Nadu such as Adichanallur, Kilanamandi, Porutnal, Kodumanal, Sanur, Aurovile, Sulapuram, Sulur, Kunnathur etc. One of the favourite materials for the beads during that period was steatite that too they excelled in micro beads. The recent excavations in one of the Cist at Thandikudi, Tamil Nadu have revealed nearly 850 steatite micro beads, very much similar to that of Harappan one. The Porunthal Site (6th Cent BCE), Near, Dindugul District, Tamil Nadu yielded more than 7000 steatite beads from the four cist burials. It is worthy to note that hundreds of steatite micro beads were found on the head of a man buried in a Cemetery at Harappa and may have served as a hair decoration (Dales & Kenoyer: 1991).

Cist at Thandikudi revealed truncated, biconical tablet bead of quartz which was very much akin to the Harappan terracotta and shell beads found from Baror and Mehrgarh. These beads were found both in graves and parts of ancient villages, which indicated that ordinary people used ornaments in life as well as for decorating the dead. Both the beads and the shape were first time encountered in Tamil Nadu. It again clearly indicates that Harappan affinity reached this remote village during the first millennium BCE itself.

Metal Objects

Though the Harappan Civilization is considered as a Bronze Age Civilization, the Harappans have preferred working with pure copper, which can be evidenced from the numerous copper objects of various uses. Although the process of copper alloying was common practice in Harappan contemporaneous Civilizations, only 30% of the 177 investigated copper artefacts from Harappa and Mohenjo-Daro exhibit tin, arsenic, nickel, or lead alloying, with tin being the most common. The Harappans were aware of the lost-wax process, also known as cire-perdue. However, most objects were made by beating with a hammer on the hot or cold metal. In addition to copper, the Harappans also worked with gold, silver, and lead..

The position is same to their Contemporary other chalcolithic Cultures of Central and South India, but the recent archaeological researches in Tamil Nadu revealed that this region witnessed Iron Age, having identical beads and materials, ceramic traditions, graffiti marks, burials, etc. The copper and bronze objects found at both areas are identical in shapes, sizes and also in metallurgical studies.

The alloys of only copper with a higher percentage of tin), which are found from early contexts from Indian antiquity. In particular, the deliberate use was made of beta bronze with around 22–24 % tin.

Origins, a long-standing practice of using binary tin-bronzes (i.e. only copper-tin alloys) can be detected going back to Harappan bronzes In Adichanallur Urn with skeletal remains along with bronze objects in Locality C, excavated in 2021 by Archacological Survey of India (Arun Raj, Yathees Kumar, Muthukumar) and analysed by Sharada Srinivasan and IGCAR, Kalpakkam, showed a markedly high-tin bronze composition from surface X Ray Fluorescence analysis with more than 50% tin compared to copper and high tin bronze AMS dates go back to 1384 BCE

The similar Copper/ high tin Bronze objects from the Iron Age sites in Tamil Nadu viz., Adichanallur, Kaniyampundi, Udakamandalam. Nilgiris, Anaimalai, Kodumanal, Parambu, Sulapuram, Aurovile, Suttukeni, Chettipalayam, Sasthapuram, Kovankulam Kaspa, Thirumalaipuram, Thulukkarpatti, Panisakulam, Appukkal in Tamil Nadu

In Nagpur region, Iron Age Sites like Borgaon, Khairwada, Bhagimohari, Mahurhjari, Raipur and Brahmagiri. In Andhra Pradesh, Iron Age sites of Moula Ali, Chagatur, Raigir and Haitipalma, In Kartataka State Iron Age Site, Tekkalakota, Maski, Hallur and Terdal and Kerala State Iron Age Burials, Ramakamedu, Puliyur, Kattipoyil and Arippa Copper and Bronze revealed the perfection attained by them during the 2nd Millennium BCE, contemporary to the mature and Late Harappans (Map 2).

In continuation of the above, as far as Iron is concerned, the recent excavations conducted at Adichanallur, Mayiladumparai, Telunganur and Mangadu indicate the date of the introduction of iron in South India goes back to the second millennium BCE. Further, the dates from the sites like Abhaipur, Adam, Ahar, Aktha, Atranjikhera, Brahmagiri, Bukkasagara, Dadupur, Eran, Gachbowli, Gufkral, Hallur, Jhusi, Kadabakele, Kilnamandi, Kumaranahalli, Lahuradeva, Malhar, Mangadu, Mangalkot, Maski, Mayiladumparai, Pandu Rajar Dhibi, Rajpura, Raja-Nala-Ka-Tila, Ramapuram, Sanganakallu-Kupgal, Sivakalai, Vallam, Veerapuram and Watgal clearly indicates that the Copper Age of North India and the Iron Age of South India are contemporary. The recent scientific dating's also opines the same. Further researches may shed more light on the matter.

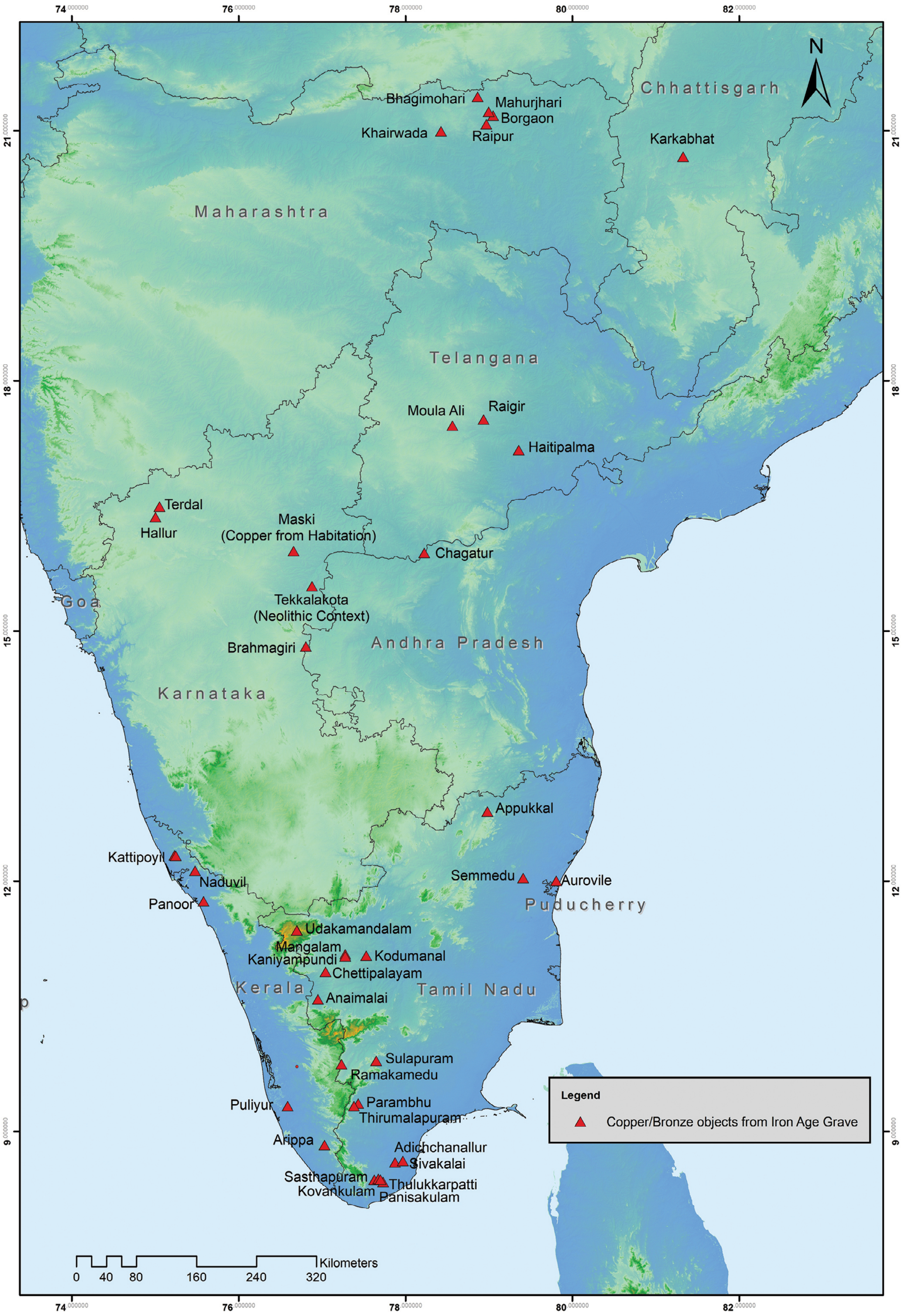
The Harappan script and Graffiti Marks

Harappan script from seals and sealings, terracotta cakes and cones, copper objects, ceramics and other materials is not yet been deciphered satisfactorily. The researches on the script and graffiti marks of the Harappans and the Graffiti marks on the pot shreds of the Iron Age sites of Tamil Nadu by Prof. Rajan and others are almost identical. According to them, the symbols on the seals and sealings of the former are more than 50% identical while the graffiti marks are 80% identical.

Disposal of Dead

Harappan burials have a wide distribution throughout its large cultural domain in the Indus Valley, the Ghaggar – Saraswati basin in the east and Gujarat in the south. Burials in the Indus valley are reported from Harappa, Mohenjodaro, Chanhudaro, and other sites. Other important burial sites beyond the Indus are Rupar, in Punjab; Kalibangan, Tarkhanwala Dera, Rakhigarhi and Farmana in the Ghaggar-Saraswati basin, and from Gujarat: Dholavira, Surkotada, Lothal and Nagwada. Generally, the burial grounds or the cemeteries were segregated from the main settlement, often choosing grounds a little away from the main habitation area (Ajithprasad et.al. 2023: 73-101).

The main burial types noticed in both the regions are rectangular memorial is further classified into three distinct variants viz., 1. Built memorial, Cist, or Cist in Cairn and Rock-cut, 2. Cairn: round, oval, long oval, or egg-shaped, 3. Composite graves in a circle, a semicircle, or a rectangle, 4. Fractional Burial, 5. Inhumation and 6. Hemispherical monument or tumulus. If it is a extended burial, it is laid in north-south orientation and the head towards the north, with arms pressed together and the body laid in a supine position, legs slightly flexed and feet touching. One notable grave from Lothal contained a joint burial of two adult males lined with mud bricks. The one from Rakhigarhi reveals that brick covered grave pits with wooden coffin. The latter also revealed different type of burial pits were undercut to form an earthen overhang and body was placed below this; and then top of grave was filled with bricks to form a roof structure over the grave. If it is a secondary burial, then the pit contains post exposure along with pottery and post-cremation burial along with pottery or oval grave-pit, containing only pottery and other funerary objects. These oval pits are laminated by flat stones along with jars, vase, bowl, dish, conical flask and dish on stand and covering it with huge slab along with cairns on the top.



Map 2: Iron Age graves excavated in Peninsular India contain Copper / high - Tin Bronze objects (14th Cent. BCE to 6th Cent. BCE)

The grave goods contain pottery of everyday use, where some with grains of food. The other items include steatite micro beads, gold beads, gold fillet-shaped ornaments and shell bangles, a gold armlet, semi-precious stones have been found lying near the head, suggesting that they were part of some sort of necklace. Copper ear rings and rings, shell bangles, chank shell and terracotta bangles and beads. Furthermore, animal remains from Lothal burials, such as the teeth of Bos indicus and sheep horns, suggest that animals were either sacrificed or offered to the dead. These burial customs indicated social stratification, with distinct differences in grave goods.

The burials types mentioned above clearly denotes the same type of disposal was followed in Tamil Nadu. The recent excavations at Adichanallur have revealed interesting data on the grave goods, ornaments and sacrificed animals (Arun Raj, Yathees Kuamr, Muthukumar 2022). Adichanallur has revealed food grains like paddy, millets, evidences of milk product kept in the bowl and sacrificed Bos bubalis and goat along with human burials etc.

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Some Cultural Vestiges of the Indus Civilization in the Vedic Sources

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Indus civilization vanished at around 1800-1600 BCE and disintegrated into many local cultures. It is believed that the people of that civilization migrated towards the east and the south and mingled with the existing populations wherever and whoever they were. The next batch of people with their Indo-Aryan language migrated at about 1200 BCE into the Sapta Sindhu area where originally the Indus civilization had flourished; they must have associated themselves with the descendants of the earlier migrants of a different tongue, most probably Proto Dravidian.

But then they were in their low-lying phase when compared to the mature Indus period and almost reverted to the early agricultural way of life with their own beliefs and rituals. The next phase of urbanization in the Ganges valley started by about 600 BCE after the assimilations of both the cultures.

In between, we do not have any material evidence other than Painted Gray Ware (PGW), Black and Red Ware (BRW) and Black-Slipped Ware (BSW) to understand the overlapping of those cultures and their mutual development. PGW, though, has a unique identity and could not be firmly associated with Vedic Aryans, even though its first occurrence was at Ahichatra, Bhagawanpur etc. Late Harappan culture extended into the Upper Ganga-Yamuna daub, where Ochre Coloured Pottery (OCP) ware culture prevailed in the 2nd millennium BCE. PGW is also dated to the late 2nd millennium BCE and continues until at least the middle of the first millennium BCE. The earliest occurrence of PGW was restricted to Hagger valley, where the late Harappan phase had overlapped. The period also witnessed BRW and BSW potteries. So, that was the period lasting from 2nd millennium to early 1st millennium when PGW, BRW and BSW co-existed. There is no single, uniform culture that coincides with the entire area associated with Rg Vedic Aryans. They were not an identifiable group with a recognizable assemblage of material culture.

However, a corpus of Vedic literature with its oral tradition came down and this is another parallel source available for that intermediate period. It gives some glimpses of that period in its own way. Scholars tried to identify some

vestiges of the Indus culture in the Rg and later Vedic literatures. This indicates that some of the Indus techniques were adapted in the Vedic culture.

The migrants were neither a distinct racial group nor their conquest and the subsequent imposition of language were explicitly recorded. In the plain, that is, in the Sapta Sindu, migration would perhaps be a more feasible proposition. A number of overlapping and distinct cultures prevailed in this region during this period. The assertion of power by Aryan speakers over the settled population notwithstanding, a mutual acculturation took place resulting in new cultural forms and the acceptance of the Aryan language. Rg Vedic people were migratory pastoralists who then settled but remained largely tribal, holding cattle as their main wealth and practising religious rites with a component of shamanism that was alien to the indigenous groups; but they affiliated themselves with others and possibly, with the tradition of the land they had come to. Here we could recognize some aspects of this culture in some particular conjectures.

Agnisayana

Agnisayana means raising a fire (ceremony) which is an optional auxiliary rite of soma sacrifices such as rajasurya, vajapeya and asvamedha. It is a ritual that involves building sacred fire and altar and making offerings in it. Kandas vi to x, which is almost one-third of Satapata Brahmana, an expounding prose of Sukla Yajur Vedam, elaborately explains this ceremony.

First, the place which is to be a Vedi (fire altar) was measured with a rope made of munja grass. The length of place should be equal to twice the length and height of the sacrificer. Then the Vedi altar was ploughed with a wooden plough. On a ball of clay, a horse's footprints was taken.

On the 8th day after the full moon of the month palkuna, the materials for making the fire pan (ukha) and an abri (spade) made of bamboo were selected. After some rituals, water was poured on the clay, and a goat's hair, gravel, stone crushes and iron rust were mixed in it. From the mixed clay, the wife of the sacrificer makes the first brick called 'Asada' (according to some texts, the priest himself made this). With the same clay he prepares the ukha and also the other bricks. The sacrificer hired at least four priests with three assistants to perform this ceremony. Adhvaryu, who was responsible for the physical details of the sacrifice, chanted the Yajur Veda. Hotri recited the Rg Veda, Udgatri sang the Sama hymns and a brahmin, who supervised the ceremony, recited the Atharva Veda; the Brahmin was also responsible for correcting any error that may occur.

There were three pits to accommodate three types of fire; the pits were in square , round and an unspecified shape. The vessels used were a poker, a pot called agnihotrasthali, a spoon and a larger ladle called agnihotrhavani. It is noteworthy that the participating priest mentioned earlier did not have a specific name; he was known only as Brahmin. He was the supervisor of all the procedures besides being the reciter of the Atharva Veda. It is believed by most scholars that the Yajur Veda included many aboriginal customs and magic practices that originally belonged to the aliant (???) group of Vedic culture. The adhvaryu first fumigated the fire pan and then put it in the fire till it was baked; the other bricks were also baked till they turned red. He placed the fire pan and some other vessels (mahavira) in an inverted position in the fire. When the flame rose, he kindled it with so many specified woods.

The Vedi had five layers of bricks totalling 1000 (in some texts the number of bricks is given as 10,800). The altar may be of various shapes depending the rewards expected; they were shaped like a hawk (for swargakami), a heron (for supremacy), and so on. The bricks were triangular, square, rectangular, and so on. A sound knowledge of geometry and masonry was required for constructing the Vedi. Each brick was placed after repeating various Vedic chants. The brick was variously named—assvayan-atrana (naturally perforated), durva (green), seed shedding, tortoise, ukha, apasya, chandasya, pranabhrt (life supporting), lokamprna (group of deities), puncacuda (a nymph) and so on.

Apasya stands for water and rain; Asadha represents earth, speech, and vital airs; Asapatra symbolises enemy avoiders; Chandasya stands for cattle and food; Disya stands for quarters; Logaestaka unbaked bricks; Lokamprna represents commoners, nobility, cows, etc.; Rtvya stands for seasons; Stomestaka stands for vital air and food; Sristi indicaties creation; Yasusmati represents food and the noble warrior class. These names are symbolic and purely imaginative.

In between the work of laying bricks, oblations (gold chips) were made with the chanting of the Sama Veda hymns. After the completion of five layers of bricks, the sacrificer took a burning piece of stick, placed it on fire and continued with various homa rituals.

Making of pots is described in detail. The material added to the clay included fragments of potsherds (arma kapala) from deserted places. This is an interesting reference reminiscent of a past. T. Burrow has written about these potsherds and their availability in the deserted settlements which he said must have belonged to earlier Harappan settlement. This act, according to Romila Thapar, reflects shamanistic survival of Vedic people.

Though the act is shamanist, it is true that the potsherds were from places deserted in an earlier period. For making pottery, levigated clay was used and the pots were handmade. While firing, they were in an inverted position, according to Satapata brahmana. The technique was a basic feature of BRW, which is described as asura type by the Vedas. But there is no specific mention about the double colour in pottery. The firing of Ukha and Mahavira was not done in a deep, closed pit; they might have been fired in an open kiln until they turned red.

While Hyla S. Converse is of the opinion that brick-making was a Harappan activity, Romila Thapar opines that this type of brick-making is different from the one practised in Harappa. This is evident from the size of the bricks prescribed in the texts and they are similar to the one in the pre-Harappan period. According to the texts, a large number of bricks were used, which essentially needs the involvement of a greater number of people. How can people who had not used the bricks for their regular ordinary use reconcile this contradiction? All the bricks are named, mostly symbolic in nature. Chattopatyaya commented that the building of the Vedi, i.e. placing of bricks must be purely of imaginative enacting performance with large no of bricks with unbelievable extraordinary names. The texts, while detailing the preparation of the pot, are silent about the brick-making process. The bricks might have been brought either from the earlier settlements of the Indus culture or the descendants who knew the brickmaking process would have been involved. Istaka, a word denoting brick, has any/no root in the Indo-Aryan languages and it is noteworthy that the usage starts from the Yajur Veda period. Thus, one could easily infer that the Indus cultural remains recorded and shadowed in the Rg Veda

and the latter texts. The rituals described in the Rg Veda and the latter Vedic texts show the evolution of some of the ritual practices.

The Agnisayana ritual symbolizes the amalgamation of cultures going back to shamanism, the sacrificial cult of Rg Veda, forms of possible Harappan survivals and the accretion of more recent practices, perhaps taken from the aboriginal BRW culture.

Asvamedha

Asvamedha was the grandest of all the religious rites of ancient India. In Rg Veda 5/27/4, it signifies the ultimate truth or reality. In 5/27/5, it symbolizes the flow of creative power and the bliss represented by the essence of Soma. In Rg Veda 8/68/15 and 8/68/16, asvamedha is said to lead to the attainment of strength and the flow of life force. It leads to the enhancement of one's intellect, meaning awakening of wisdom, through which humanity is established in the supreme.

The Vedas tell that human consciousness is purified through asvamedha. By performing this sacrifice with proper Vedic procedure, the performer attains control over his senses; while living on the earth, he enjoys enough material pleasure. When a king performs asvamedha, he strengthens his position and declares his glory and victory. It is said that for empowerment and glory, it has to be performed by the king. To the kings, this performance proves their imperial sovereignty.

If we take it in a different connotation, we get an altogether new meaning for 'asva'. The root 'as' means accumulation and 'va' means blowing. Together 'asva' means obtaining or accumulating wealth by blowing.

It appears that originally it might have been associated with the accumulation of wealth by smelting metals. Rg Vedic people might have used this word to describe smeltery. After all, metals are the basis of all wealth. Rg Veda 3/29/6 mentions that the furnace of the (yagna) sacrifice is to be made of stone. 1/142/6 mentions that there were openings in the furnace that were closed during the sacrifice according to protocol. The descriptions indicate that precise control of the fire was essential for the yagna. Considering the overall level of technology, it would seem totally out of place that such elaborate furnaces were built with an opening, which can be opened and closed as per the requirement. Verse 3/1/4 tells us that the fire used to be white in the beginning and became red later. This is a typical phenomenon in smeltery.

When metals nears the melting points, more air is pumped in and this leads to the fire turning red.In the latter period the form of yagna appears to have transformed completely. 'Asva' gives the same meaning as horse, an important and useful animal—not an aboriginal species, for conquering the new area that Vedic people moved into. They might have sacrificed this animal as a ritual to get wealth and prosperity in the beginning. According to the Ramayana, the first king Ikshuvaku, who was mentioned in Rg Veda, performed this sacrifice. This yagna's association with smeltery seemed to continue until the time of the king Sagar.

There is a significance difference between the description of the same rituals in the Rg Veda and the later Vedic texts (Yajur Veda, Satapata baramana, etc.). Rg Veda describes a relatively simple ritual in which the horse is sacrificed for the acquisition of wealth, prosperity and magical powers. In the latter texts, it becomes an elaborate ritual involving the fire altar and consisting

of many levels of activities spread over many months. The ceremony includes fertility rites and the notion of a potlatch, which is as much a declaration of political ascendancy and as social status. This sacrifice described in the Satapata Brahmana and Ramayana might represent the coming together of many rituals of diverse origins. Copper smeltery was the characteristic of the chalcolithic period and must have been originally discovered by the Indus people and then incorporated into the Veda as a ritual. Adaptation of tradition and knowledge is common in the form of rituals—sometimes without even understanding the actual meaning of the words, practised by the Vedic pastoral community while it settled and associated with other non-Vedic cultures.

Sulba sutras

Sulba sutras are the manuals for the performance of sacrifices. These are the branches of Srouta Sutra. They deal specifically with the rules for the measurement and constructions of various sacrificial fires and altars. Sulba means a cord, a rope, or a string; its root sulb denotes measuring or the act of measurement. Sulbavid was one who had taken up measuring as a profession. These texts talk of constructions of various sacrificial fire altars, and the technology of civil engineering.

The fire altars were constructed with a fixed number of burnt bricks and with specific areas in different layers. It shows the existence of structural planning and a systematic way of building bricks with perfect measurements. The different sizes of bricks, their measurement, their placement and different orders point to the existence of advanced civil engineering technology along with perfect calculations.

Sulba Sutras are intended for the use of the priestly Brahmana community whose hereditary profession is to conduct the sacrificial rituals. On the basis of the style and grammar of the language, Baudhaya and Manava Sulba Sutras are dated to 800-500 BCE and Katyayana probably belongs to the mid 4th BCE. The period in which these texts were composed coexists with the period of using PGW. But the settlements were rural in nature. Mud and mud-brick houses, embarkments and wattle and daub structures are found at many places of this culture.

Community hearths, storage bins, raised mud platforms are encountered at many palaces of this culture during excavations (Atranjikara, Bhagawanpur, Jakkera etc.).

Shamanism and ritualistic beliefs are the characteristic features of Vedism. The technological knowledge encapsulated in the Sulba Sutras is not necessary for that. But acquiring all this knowledge is a basic necessity for professional brick makers, masons and builders, who were the persons actually engaged in the work and in executing them.

Katyayana's Sulba Sutra stipulate the qualifications of those people. "One who is fully engrossed in work; one who is conversant with different sides/divisions; one who is well acquainted with the thoughts of other schools. Should always consult the engineer and the architect while performing the act (Kat. Sulb. Sutra; ch.7: slo:6).

This explicitly shows the involvement of 'Silpi', 'Sthapthi' who were conversant with other schools that are different from the Vedic culture ('Parasastra Kudukala').

Balakanta of the Ramayana also specifies the participation of 'karmika' (manual worker), silpakara, mason (vartaka), the digger and the one is conversant with measurements. The Mahabharata records an incident in which an architect (vastuvid) after finishing all the construction work, finds an error and rectifies it. These are some references which give a clue to the participation of some technologists other than those from the priestly class. It is to be reminded that in the construction of agnisayana a Brahmana, without any specific name supervises the construction and chants Atharva Veda. That brahmana might have been baptized from other dvija community (which includes silpakaras) to do the work. The knowledge contained in Sulba Sutras of the late Vedic texts must have been obtained from the local technical people, who traditionally acquired this knowledge from the Indus legacy and recorded it in these religious texts.

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What The Seven Pleiad Sisters Can Tell Us: By Their Presence in Mesopotamia, on IVC Seals, and in Kongu Nadu Today

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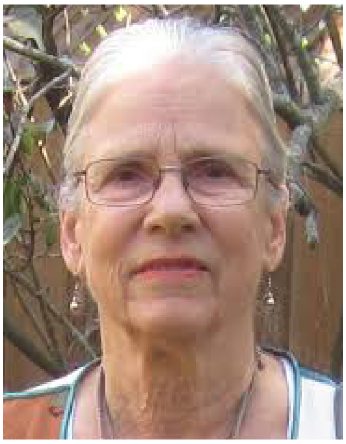


In 1985, Asko Parpola wrote a book entitled 'The Sky-Garment' leaving a major legacy for Indologists. In it, he discusses his deductions about early Harappan religion. He explores those observations and their links to even older Mesopotamian traditions, as well as their connection to later Indian Hindu thought found in early Sanskrit texts and beyond. In particular, he discusses a sacred sky-motif he calls the 'trefoil', that appears (Fig. 1) on an Indus stand that was probably used to hold a gnomon, the projecting piece on a sundial that shows the time by the position of its shadow. Fig. 2 shows the same design, this time used on the clothing of a king, probably one having at least semi-divine status. These two illustrations link the trefoil motif to the daytime movement of the sun across the sky and to the larger canopy of stars that follow a similar path all night long. The third illustration Parpola uses (Fig. 3) is, by contrast, from the city of Ur, in Mesopotamia. It shows the same trefoil motif, here applied to a cow. It places both the sun and the moon on the cow's back. This third example, furthermore, gives this beast a bird-like beak suggesting that this special bovine also had an additional quality as a winged being and, therefore, it likely dwelt in the sky. All three examples taken together serve to suggest links between early Mesopotamian design traditions and beliefs about sky beings that were likely popular in the Indus Valley as well.

I now move to a more elaborate visual depiction of Mesopotamian beliefs about the powers that dwell in the sky. These are described in three very useful books by Gavin White. His work is rich with sketches that depict many sky-linked Mesopotamian beings. I will focus on the Pleiades, which White tells us was called 'the star-cluster' in Sumerian and Akkadian. Other researchers may want to scour his writings for additional ideas and IVC parallels. White makes it clear that this star-cluster was the lead constellation in early Babylonian star lists that also referenced the movements of the moon. These lists have an equivalent in the 27 (later 28) mansions of the

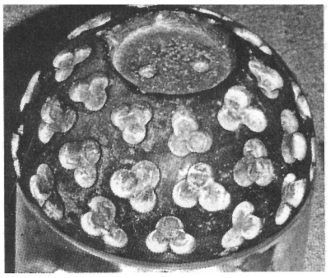


Fig. 1

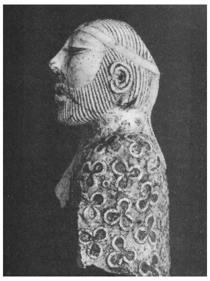


Fig. 2

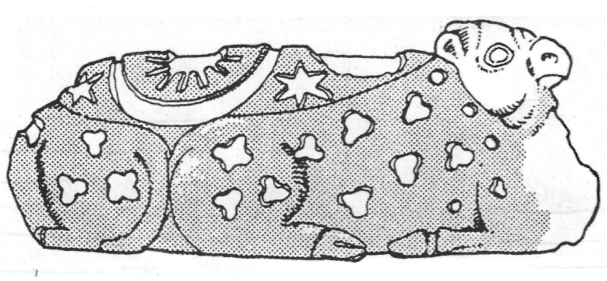


Fig. 3

moon described in early Sanskrit sources. There the name for the Pleiades is Krittikka, meaning something like the 'cutter' or 'divider'. In both systems, this specific constellation was the one given pride of place, being the first in the list of recognizable star groups that became named regions in the broader skyscape. At least in India, the moon is said to be visiting a specific mistress as it passes through each of those mansions each month, in an order sequence that has been well-known for many millennia. Both the names and the number of those 'houses' differed between these two cultural settings. But we will first focus on the similarities, and on the period around 2,300 BC when the spring equinox was heralded as the day when, during each 24-hour period, the length of the day would finally become longer than the opposing period of darkness. The Pleiades was considered to announce this shift because it would rise just before the sun on that special (spring equinox) day. In a sense, the Pleiades was the expedition leader, showing the sun the way across the sky, including where to rise and where to set. The preceding six months, when darkness lasted longer than daylight each day, began at the autumn equinox. Because of a well-known phenomenon, the precession of the earth's axis, a circular 'wobble' in the earth's axis that takes approximately 26,000 years to complete, there have been changes needed to adjust to this gradual change. Now Asvini, the constellation named after a stallion, rises just before the sun on the day of the spring equinox, and that has caused some adjustments to this star-linked calendrical thinking. This essay, however, will focus on that earlier era, a time when the Sun's movements were linked to the nighttime travel of the Pleiades across the sky. In that era, this star cluster appeared to be the sun's advance 'scout.' It was, in a sense, showing the sun the way, just as it once served as a sailors' compass, showing them the way across the seas.

First of all, in Babylonia, the Pleiades were thought to carry two different tools with them, a saw and a set of scales (Fig 4). Why those specific tools? It was because there were just two points in each year when there was an exact balance between the length of the day and the night (the two equinox points). Those were the two times when the gnome's stick or string would announce the midpoint, that point on the arc of the sun's travel each day when the night and the day were exactly equal length, easily compared to balance point on a set of scales. The cutting tool (I suggest) was for the other pair of key solar events, the solstice points when the sun actually reverses its direction of movement along the horizon. After rising slightly further north on the horizon each day, it was known and expected that it would suddenly and quite dramatically reverse its direction and rise a little further south each ensuing day for the next six months. That was a remarkable moment that was highly anticipated. It was as if some unseen rope had been pulling the sun northward for six months. Then that rope was suddenly cut and

Fig. 4

a new one tied to the sun's chariot that would then pull it back in the opposite direction for the ensuing six months. The idea that a knife was used by the Krittikka to cut that rope was a plausible way to think about this change. Who better to do that work of cutting, sawing or severing than the Pleiades constellation?

Of course, the two halves of the year were also linked to two contrasting periods of the year in agricultural terms. As the sun moved north following the spring equinox, a lion was used as a metaphor to suggest that the heat of the sun now resembled the power of this great beast. As the days grew hotter, people quarreled. The lion was winning and becoming dominant (Fig. 5). By contrast, the portion of the year following the autumn equinox brought wind and clouds. After that, the land would cool and that period was symbolized by a different image, a moisture-filled sky-bull. In Mesopotamian thought, the season of war, heat and death from strife was contrasted with one when the ploughing and planting were prevalent (Fig 6). This period was associated with water flowing from the sky in the form of rivers and rain, and (on the far left of Fig. 6) a tiny embryo formed and its growth in a dark womb began. Figure 7 gives one a sense of the bigger picture, one where (on the left) the spotted bull was about to rise up, protected by the Pleiades (the triangle just next to his horns). He would remain strong

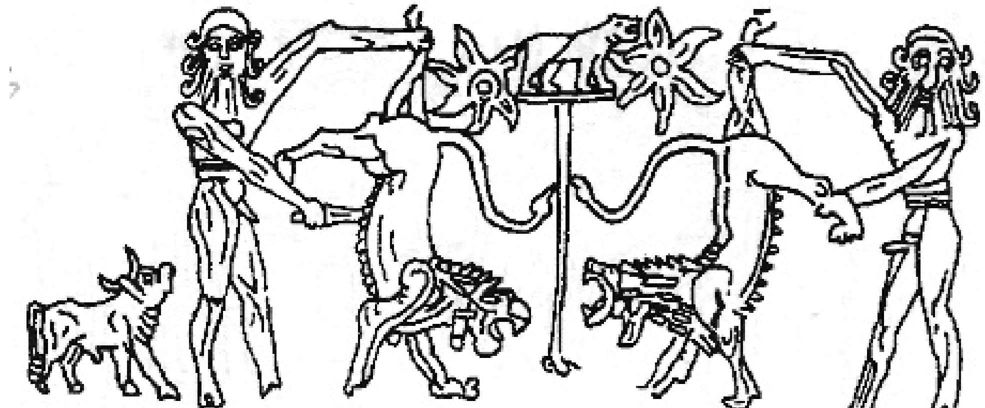


Fig. 5

Fig. 6

Fig. 7

and confident in the face of a bow and arrow (perhaps a reference to raiding forest hunters) who he believed could no longer hurt him or damage the growing crops. But in time the bull's personality shifts and again he becomes calm and placid as spring arrives. It is now the lion that has grown 'spots' and wields a heavy club.

Recognizing its increasing power, the bull becomes quiet and the lion takes charge. The Pleiades are relevant here because it led the way for the sun, but soon after the spring equinox (in the Babylonian region), it would disappear below the horizon. But as the autumn equinox approached it would become visible once again. The goddess Inanna (mistress and manager of the Pleiades), held this set of scales and watched for the moment of exact equity between day and night that signaled the spring equinox. But now, at the point of the autumn equinox, a scorpion would grab the same balancing tool with its claws. The scorpion's sting is poisonous, but here that motif had other implications, including the ability to foretell impregnation. This shift to longer nights and shorter days was a sign that now the bull would take over once more. The scorpion was an omen that foretold of a period of fertility associated with the cooler months. During this period, new embryos were likely to form and incubate (unseen) in the night sky, awaiting spring to descend to earth, where they would emerge in the human world and become visible. Several of White's Babylonian sketches show a scorpion located under a marriage bed, or else just adjacent to a couple in the act of copulation.

In Babylon, the Pleiades constellation had in sum, a double personality. It was fierce and warlike on the one hand, but also fertile and gentle at other times. In many, but not all, of the Babylonian designs White presents, the Pleiades are depicted using this specific symbol: seven dots (or stars) laid out together and given an almond-like form (Fig. 8). This shape resembles the form, the cluster actually has in the sky, but it also roughly approximates the shape of a womb. Most often, White's illustrations show the Babylonian star-cluster located above a ploughing scene (Fig.9) or other fertility-related activity: a scene (Fig. 10), where two goats are shown mating in the cattle pen, or a scene (Fig. 11), where a mother goat is shown nursing her young kid. In all the three illustrations, we can see the star cluster presented in association with the sun and the moon. All these designs suggest that the Pleiades is present where fertility, reproduction and crop abundance are featured. In addition, the Babylonian cattle pen had a similar set of associations (Fig. 12). Here, we can see the home for cattle adorned with streaming ribbons that signal the presence of the goddess Inanna and suggest that her power is always

Fig. 8: The graphic representing the Pleiades used In Babylonia

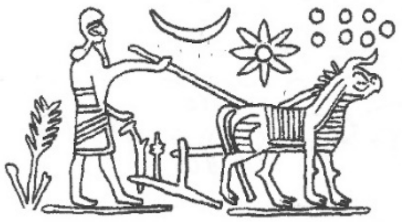


Fig. 9

Fig.10

Fig. 11

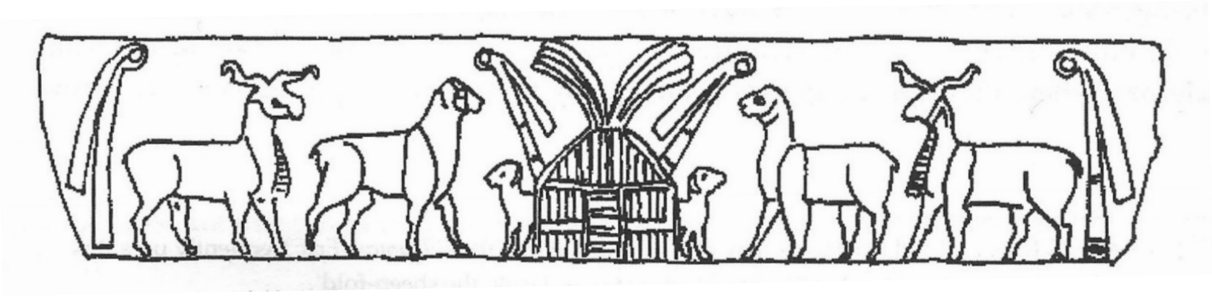


Fig. 12

shining down from above. Inanna, as already mentioned as the chief goddess, the great power that oversaw the young Pleiade maidens, her assistants. This great goddess is always close to the Babylonian cattle pen, in spirit. I show this sketch because it strongly resembles scenes that depict a cattle pen on Indus seals as well. Furthermore, the presence of the ribbon streamers appears to convey the idea that it is early morning, the time when the sun's rays are new, fresh and only its gentle beams of light are present.

Added to these loving scenes of motherly help and guidance governed by a great goddess, the Pleiades also have a fiercer, less visible and somewhat violent underside, at least according to White. This is because, this star-cluster contains a special (negative) link to the planet Mars, and to Mercury and Saturn as well. Many omens predict ominous consequences when any one of those three planets approach the star cluster. In Fig.13 and 14, we can see two interesting sketches that White has published. Both depicts the killing of the famous Babylonian ogre Humbaba. In the first, the Pleiades and the moon hover together over his head while Gilgamesh and his assistant Enkidu control him from either side. It appears that the artist who developed this design intended to honour the moon as well. The moon and the Pleiades seem to be partners in achieving this ogre's capture and slaughter. Furthermore, Fig. 13 contains two variants of Humbaba's death; one where the Pleiades hover over his head, and other, where the cluster is presented as a rosette associated with the birth of two children, seemingly one boy

and one girl. In the second design, we can note that Humbaba is shown kneeling before his captors, Gilgamesh and Enkidu, while seven circles are once again seen over him. But this time those circles are encompassed by a design strongly suggestive of two entwined snakes. Snakes are frequently used as a symbol of transformation and rebirth, since they can repeatedly shed their skins and begin life anew. A pair of entwined snakes, moreover suggests copulation and insemination. In both scenes, the Pleiades have a role, because in each they bless the killing of a disruptive being by two noble warriors. However, in contrast to the first scene, the second we shows both sides of the Pleiades' personality. On the left, they are tame and relaxed, rather like a blessing from an outstretched hand; but on the right, the same seven are shown in their more ambivalent form, as half a bright fist or rosette and half as a snake. In this second example, they may also be signaling that, like a snake, Humbaba perhaps has a chance at rebirth. There is no room for a further discussion of this Gilgamesh story here. Interested readers can consult Chapter 3 of Beck 2023b to learn more about the key role a Humbaba-like figure plays in the Annanmar story as well. In both legends, significantly, Humbaba is followed by seven auras (lights or powers) as he moves. When he eventually dies, these auras are transferred to 1) the fields, 2) the rivers, 3) the reed-beds, 4) the lions, 5) the palace, 6) the forests, and the seventh goes to the underworld goddess Nunga. This process of transfer provides a strong parallel with the final segment of the Annanmar folk epic, where the severed head of a great wild boar (a parallel in that story to the ogre Humbaba) is taken to the earth-goddess Bhudevi, who reacts (implicitly, by swallowing it) and then magically births a new era as she rises from the waters of the deep.

Gavin White also provides several more images (Fig. 15 and Fig. 4) of divine figures who have similar flame-like auras. These are sun-like flames that seem to resemble the star cluster's own hot energy which helps warriors with their noble battles at moments when the Pleiades hover over them. The eye of the bull of heaven, a star named Aldebaran, is another example of the same principle: the star-cluster helps all who respect these seven stars and call upon them for aid. In the case of the eye of the bull of heaven, Babylonian tradition says that it glowed red

Fig.13

Fig. 14

and thus they called it the 'star of fire.' Perhaps the star cluster is actually the source of the hot light in the bull's eye. After all, the Pleiades were thought to be a bunch of youthful females whose darting here and there might easily have stirred up male desire and thereby lent the bull added power. We will soon see how important the heat and fire of the Pleiades also was depicted in several Indus valley seal examples. All over Tamil Nadu, something akin to a bull-fighting tradition persists which may bear some links to this theme. But instead of trying to spear a bull, as happens in Spain, here youthful and very brave human males try to hold on to a running bull's 'hump' and thereby win for themselves some of its power. Sometimes a gift was even tied between the horns of that rampaging bull, at least in earlier times, and even greater glory awaited the young man who could grab that fine prize. Since the prize was tied between the horns, it could have been a symbol of the Pleiades themselves and thus, something very desirable that the young man could win-a blessing from those seven lovely maidens!

We have already seen that the bull of heaven was 'cool' by comparison with the ferocity of the lion of summer. We have seen that White provides sketches, where the bull of heaven is depicted with wings and with the Pleiades star cluster shown above its back (Fig. 16). In Fig. 17, the same great bull is pictured gazing at that very star cluster, which is located just above his hump and close to his horns; the same position it occupies in the sky. Fig. 17 also includes a goddess whom

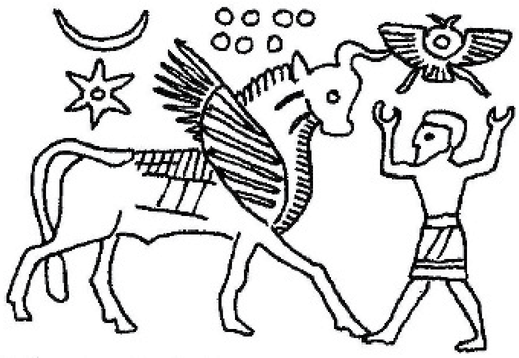


Fig. 15

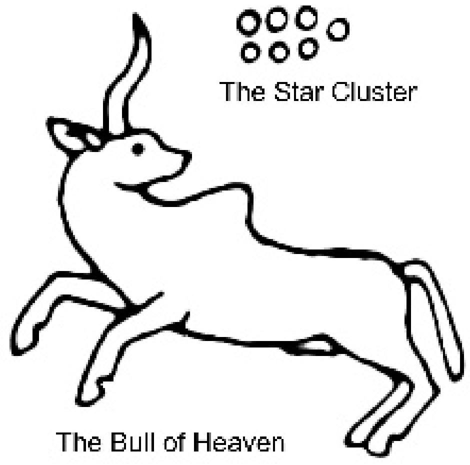


Fig. 16

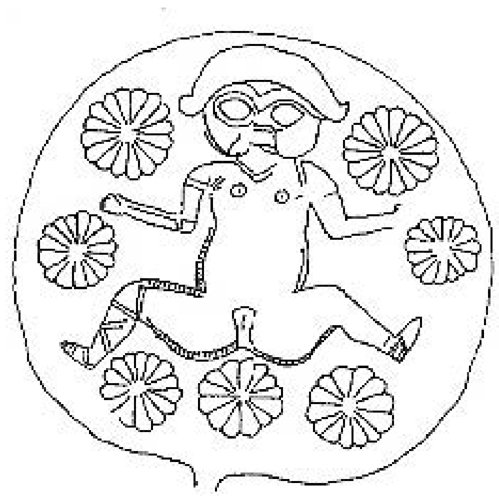


Fig.17

Fig. 18

White calls the "Birthing maiden with flowers in a pool." She is surrounded by seven flower-like rosettes, once again a Babylonian way of depicting a fertile sky-goddess radiating her fertility via the help of her young assistants. Seen this way, those seven rosettes would be a reference to her seven youthful helpers. Fig. 18 presents an image of the Hindu goddess Lajja Gauri, who looks surprisingly similar. I suggest that this is a Hindu echo of the same idea, that she is also a birthing goddess associated with the Pleiades cluster. Her open vagina is the black hole (the womb) that is easily seen in the sky, the dark area that the seven Pleiades surround. This image, in sum, is not pornography; it is intended to represent a broad concept of how the cosmos, as seen in the sky, continually gives birth.

Part Two: Indus Valley graphic examples that feature symbols of Fire and/or display number seven

In the Indus Valley, there are many circular images that look quite similar to the one seen in Fig.18. But now, in Fig 19, instead of seeing an explicit design of a goddess in the process of birthing a child, we see simple circles featured in various ways. Each (I think) indicates a locus of creative power, likely a well in which the goddess is thought to reside. The seven surrounding circles (or leafy branches in Fig. 19 C) would then be a reference to the seven young maidens (likely prepuberty girls) who stand nearby to help her. Those seven are not midwives, but nursemaids who help care for the tender babies that continually emerge. This 'hole in the sky' is shown surrounded by seven circles (seemingly the check alignment leaves of the sacred Ficus religiosa – known as the 'peepul' tree). Designs A, B and C likely refer to a ring around a well (or other water source). Thus, this hole is well protected. But on another level, we can easily interpret these same designs as metaphorically referencing the womb in the sky that the Pleiades surround. Example C expresses the same idea: leaves are also helpers. They surround a tree during its growth and nurse it by converting the 'milk created by sunlight' into liquid sap, especially when the leaves are moist, green and new.

The last example (D) shown in Fig. 19 presents the reverse side of the example seen in C. I believe that the reverse side of an IVC seal can be very useful in helping us to interpret what is seen on side 1. Here, in example D, the fish is an obvious reference to the waters of the sky, and the upward-pointing arrow is likely a sign used to depict the fertility and power that resides there. There is a possible link between that arrow and Murgun's weapon, the great vel. The arrow could also reference the semen or life-giving power of the great bull of the sky, who

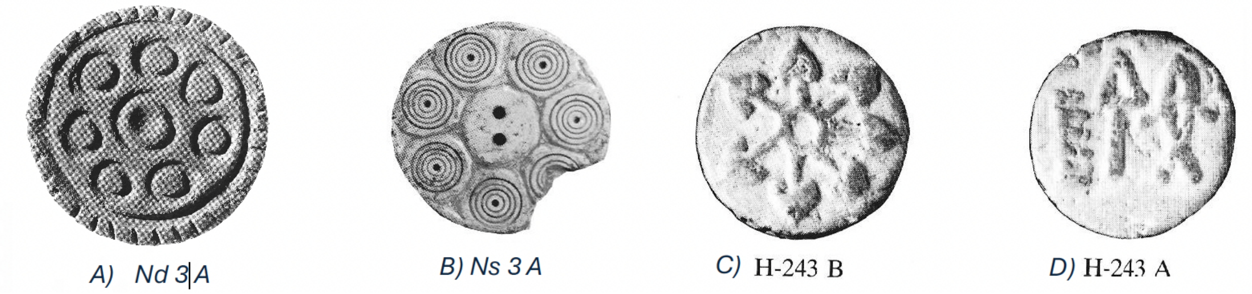


Fig. 19: A, B, C and D

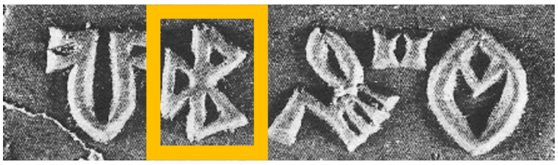
(seen through Mesopotamian eyes) ruled during the winter months when the Pleiades were visible. The third sign on the reverse side (D) of this Indus seal is likely a cutter, a knife, or a razor of some sort. I believe a comb is another likely metaphor here: just as a comb has spikes or fingers, a cutter has teeth. A comb is a tool used by women to separate strands of head hair that have become tangled. The knife or cutter, furthermore, is explicitly linked to the Pleiades (who are females with long hair). In Mesopotamia, this knife or cutter helps the rising sun cut through the mountains at dawn and shine forth. The same cutter could also be used, in association with the Pleiades, to cut the metaphorical rope or harness that drags the sun along that horizon, moving its position slightly each day. The cutter could perhaps slice through

those reins, separating the sun from its vehicle so that it is free to turn around. All these versions of 'cutting' are compatible with the larger Nakshatra tradition that the Krittikka are ruled by the sun. Their essence (or devata) is a hot fire which 'cuts' by burning through something or (equally) can punch a hole in blackness of night to let in fresh rays of dawn. Parpola has written at length about what is clearly a related theme, that of the trefoil and its use as a symbol of life and divine power in the sky. He demonstrated that the trefoil was an emblem for a king's robe, as it expressed his connection with divine life above.

Fig. 20, illustrates the two forms of this sign: one made up of triangles and the other of three circles. This set of illustrations shows that the trefoil symbol has been used in many settings. On seal M 1789 a it is closely associated with an upside-down Y-sign which we propose symbolizes the presence of a form of a wild and dangerous energy in the sky, perhaps a thunderstorm. This same shape also appears in association with a triangular, straight-sided trefoil, possibly suggesting a moment when a divine spirit 'grabs' or possesses another being (M 1268a), or the presence of the great sky bull that roams alongside fish in the sea-that-is-the-sky. Contrast this with a tamer form, perhaps a castrated bull fed in a cattle pen on earth (M1096a bis). But the key point I want to make is that round circles are used where calmness and control prevail and things are under control, as in the case of the multiple trefoil motifs on the robe of a divine

After Marshall 1939, and Parpola, Roots, p. 233

Two ways to form this sign, using triangles or circles



M 1268 a

M 1789 a

Harappa.com/painted M 1096 a bis

antelope dish

Fig. 20: The Trefoil: A sign expressing a range of interconnections between heaven and earth

king, or their similar presence in multiples alongside a spiritual antelope that leaps gracefully through the sky. The type of object upon which trefoils are seen placed vary as well. This motif can be seen on a wide variety of seals, pots and other forms and surfaces such as round dish or a statue. The Pleiades or Krittikka motif in the Indus area can also be found in many contexts, especially ones where keeping a communication channel open between heaven and earth is likely the core theme. The trefoil may also refer to a stabilizing rotation, like that of a spinning top, or to three aspects or layers of the cosmos at large.

It is time, now, to turn specifically to the seven maidens, those young, unmarried virgin girls associated with the Pleiades constellation on IVC seal M1186. There are two obvious references to this set of youthful, pre-puberty females in the Indus seal corpus (Fig. 21). The first is a very famous seal that has been much pictured and discussed. The identity of the seven young girls seen in a row at the bottom of this seal M 1186 would now be difficult to challenge. In my view, these are clearly the Kannimar or Krittikka maidens. We can tell this from the fact that they 'almost' hold hands, that all wear their hair in a braid, all have short skirts, all have vegetal sprouts shooting upwards from their heads, and all seven are near-identical in form and posture. There is little to no individuality displayed among them.

More controversial is the identity of a second figure depicted on this seal- the one on the left, shown standing inside the peepul tree shrine. Clearly, this figure is being worshipped and is likely being offered as the severed head of a warrior. However, I believe Parpola has contributed

M 1186

Close up of M 1186: The seven sisters, the Pleiades maidens

H 97 a: Another version of the same seven girls

Fig. 21: The Seven Sisters depicted on two separate Indus seals

a definitive argument suggesting that this figure is female and is a goddess (circled in green)[1]. Furthermore, she is situated inside a (lactiferous) Ficus religiosa, above those seven Pleiad girls (circled in yellow). According to Parpola, she is likely a Durga or Kali type goddess. Parpola deduces this from the fact that she is naked and is wears a horned headdress, as similar to other ancient Near Eastern goddesses. I would further suggest that this key figure reflects the descriptions found in early Tamil Sangam texts of the ancient Tamil goddess Kottravai. Kottravai, too, had a reputation of being fierce, she accepted the lives of warriors and enjoyed offerings that contained battlefield blood.

1 Parpola, Deciphering, p. 258-9 and 261

The second seal shown in Fig. 21 (H 97a) is less well-known, but I believe it provides us with a second example of these seven young girls—this time, shown actually holding hands. In this instance, the goddess they serve does not appear above them, but is instead identified by motifs located directly in front of the group of seven maidens. White provides a useful framework for interpreting these signs. In Babylonia, three adjacent rectangles often indicated to the seat of honour accorded to a goddess. Hence, here as well, the triad of rectangles likely suggests that the goddess in question is tripartite in form.

The Babylonian sign referring to a female (her vulva), is represented by an upside-down triangle, and beneath it, her seat of honour as a goddess (namely, three adjacent rectangles). White, Queen of Heaven, p. 83.

In Mesopotamian starlore, this triad of females consisted of Eidu, Ninmah and the Bow. Taken together, they were considered to be three aspects of the great goddess Inanna or Ishtar. In the Indus Valley, an equivalent goddess was likely present, and she would likely have been the early forerunner of the present-day Hindu Trivedi grouping of Saraswati, Lakshmi and Kali, with Parvati understood as combining all three. As per Rig Vedic sources, the intermediate version may have been something like Usas (Dawn), Vac (sound) and Nirṛti (destruction). The point I am making is that there seems to have been a long-standing tradition covering this entire area, including Babylon, the Indus Valley and the Indian subcontinent as a whole, that believed in a three-part primary female divinity.

Furthermore, in all three cultural settings, we find seven sisters who serve that all-powerful goddess. Those three cultural areas also appear to agree that the seven sisters' key responsibility was to support cosmic fertility, plus animal and human prosperity at large. Two more signs or motifs seen above these seven young girls (Fig. 23, seal H 97 a), reinforce this world view. The first is a grapheme that may refer to a young embryo (or perhaps raw semen released by the bull of heaven) having been placed in a bowl, pot or womb down below Fig. 23 a), where it is

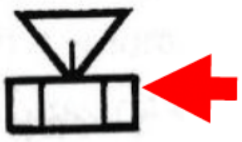
	
The Babylonian sign referring to a female (her vulva), is represented by an upside-down triangle, and beneath it, her seat of honour as a goddess (namely, three adjacent rectangles).	A sign used to refer to animals, women and goddesses – suggesting that they can be wild, furious, or even raving.
White, Starlore, p. 193.	White, Queen of Heaven, p. 83.

Fig. 22: Signs for a goddess in Babylonia

expected to transform into a new-born earth-bound being. The other sign or grapheme seen in both Figs. 22 and 23 refers to a serpent. Serpents are considered agents of transformation

Fig. 23

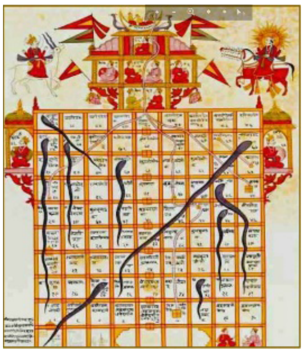


Fig. 24: Snakes and Ladders game board

in Indian tradition because they can shed their skin and thus quickly begin to lead a new life. Serpents are also thought to be able to help others morph and begin new lives. The ancient Indian game of snakes can help explain this idea (Fig. 24), because snakes in that game are responsible for grasping spirits or souls on their way to heaven, next transporting them down to the underworld (being something like a hollow slide or chute) and finally, helping that soul to transform, be rebirth, and thus readied for a new round of life on earth.

Fig. 26 gives the reader a tiny taste of the several concepts discussed above. I present them here to illustrate how these ideas have been incorporated into Tamil Nadu's Kongu Nadu area Annanmar story. An animated version of this story, beautifully illustrated by a local village artist from a village, where the story was first recorded, presents the following scenes: A) The cluster of seven sisters of the Pleiades from which the heroine, Tangal, was initially singled out by Lord Shiva. The story makes clear that he chose her, the youngest of these seven girls, to descend to earth so that she could be the younger sister of a set of twin brothers who Shiva

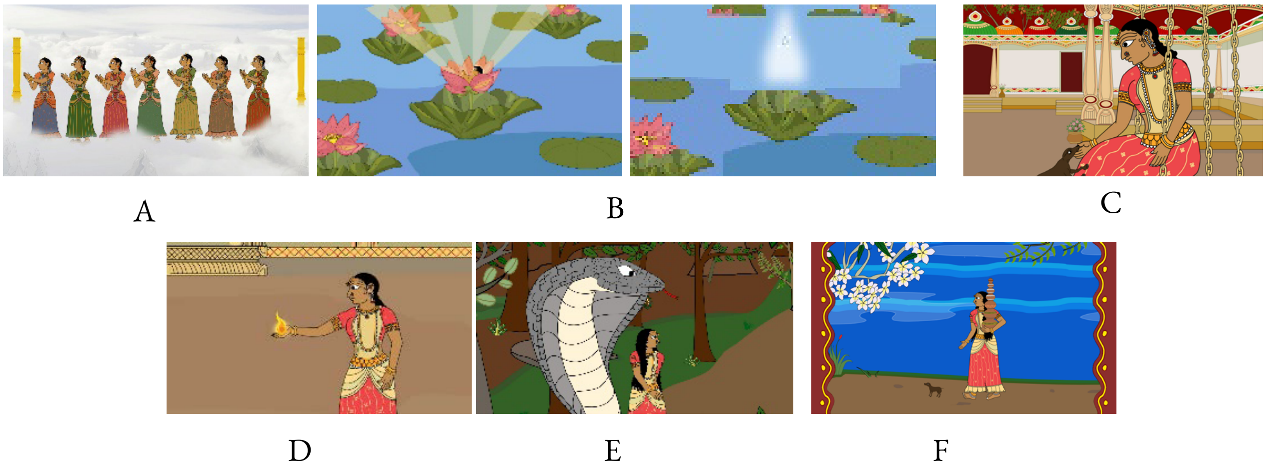


Fig. 25: Several aspects of the third generation Annanmar heroine, Tangal, that match concepts seen on the ancient Indus seal H 97 a

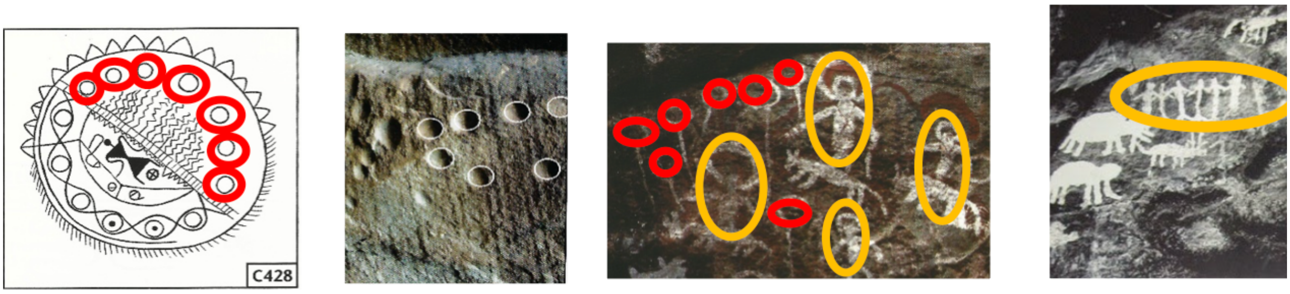
had arranged to have born alongside her in the same womb (making for a set of triplets). In the story, the girl is named 'little sister' because she emerged third (and last) from that womb. B) Tangal's mother is given a different birth story. According to a Shaivite myth, she was born from a drop of semen that fell while Shiva and Parvati, disguised as two deer (or two antelopes), were playing in the sky. That seed, in the form of Shiva's semen, fell into a lotus blossom growing in a local pond and then emerged shortly afterwards as a tiny babe. This story illustrates the local belief that children can descend from heaven in the form of seeds (or even as rain drops) that then transform into human beings after they enter a hospitable womb on earth. C) The Pleiad girl just described, born as Tangal (or 'little sister') grows into a gentle, largely home-bound princess who manages to reach the age of sixteen by the time the story ends. During those sixteen years, she never married or had any suitors. D) In this image, Tangal holds fire in her right hand. It was selected as the illustration here for two reasons. One, Shiva chose Tangal because she had a fire in her breasts, and second because, she also has a fierce and fiery side to her personality that makes her seem, at times, to be 'possessed' or raving. She acts according to what she sees in her dreams. In this illustration, she is about to set her own family palace on fire. E) Tangal is protected by a huge cobra who comes to her aid as she wanders alone through a huge mountainous forest close to the end of the story because she is searching for her two deceased brothers. She learned of their demise in a dream. F) The serpent leads her to a magical place in that forest where she is soon able to fill seven newly formed clay vessels with substances that can bring her twin brothers back from death and allow this 'little sister' to converse with them one last time. She gets to meet her two brave siblings only briefly before they leave this earth. They then rise up and return to Lord Shiva's abode in Kailasa, high above, as two spirit souls. In sum, Tangal works to help raise, guard and empower those two brothers she was born beside. This is a role closely resembling what we know about the seven sisters who once helped and supported other generations of men, long back, both in ancient Mesopotamia and (likely) in the Indus Valley area as well. Studying this local folk epic helps us to understand the ancient visual sketches and graphemes archaeologists have found. We can search these ancient treasures and try to understand their meaning, hoping to further grasp what may have been the thoughts of persons creating works of art at a distant time in the past.

Before we look at a variety of other Indus seals that likely represent the seven sisters, it will help to first consider a few other images that stem from an even earlier Mesolithic period on the Indian peninsula. In Fig. 26, illustration A is of special interest. This is a sketch of a Megalithic Cist grave, showing what appear to be the seven Pleiades, seen hovering above a buried corpse. Note that these seven circles are nearly touched by multiple wavy lines that suggest this deceased soul is rising towards them. It would seem that those seven sisters are getting ready to send that soul back, reincarnated in seed form, to become two fresh eyes hidden in the same burial plot. Those two souls will then, presumably emerge one day as a new life on earth! B) This cluster of seven early stone-age carved circles bears a striking resemblance to later artistic representations of the Pleiades. This carving has been dated as being approximately 20,000 years old. C) Four human figures with halos, riding tigers (yellow circles) are possibly following the Pleiades (seven red balls), each placed on a post that suggesting that these too might reference the 'seven sisters dwelling in the sky.' And D) Here we see what might be seven sky-dancers, the Krittikka. Maybe

those stars are guiding or advising a herd of elephants roaming through the forest? The overall conclusion from these four illustrations is obvious. The importance given to the Pleiades star cluster was widespread, and traces of them can be found all around the sub-continent, even ones dating from very early times. The important question to pose is: How did this happen?

Cross-civilization contact between continents and cultural borrowing between neighbouring societies must be a part of the answer. The Pleiades are not that prominent in the midst of a broad night sky. That black 'ocean' is filled with many, many thousands of visible stars. Why would people in so many different periods and geographic locations have chosen this one cluster and given it such prominence in their thinking? There is no space in this essay to add more detail, but many other researchers have noticed the same thing. The Pleiades is a very important star cluster for the Māori in New Zealand, as well as among a variety of similar aboriginal groups in North America.

What we do know is that the Pleiades functioned as a very important compass for early sailors. They found that they could easily adjust the direction of their travel at night accurately by referencing this specific visible star cluster that rose exactly where the sun did each day, in the East. It is also set with the sun, directly West. If one were traveling near the equator, this cluster could be seen all year long. But when further from that midpoint, sailors could see it for only half of the year. For Mesopotamians, that period of visibility happened to be conveniently aligned with the prime months for sailing. The Pleiades, roughly 2,300 BCE, was also noticeably allied with the sun and essentially seemed to move in sync with it. The cluster would always rise



A B C D

Fig. 26: Evidence of the importance of the Pleiades even in Mesolithic times, throughout the Indian peninsula

just before the morning sun, especially on the all-important day of the spring equinox. It was as if its job was to announce the moment and the precise spot on the horizon where the sun would appear for the last time that year, before it would turn back on its course. The arrival of Pleiades that day would not only announce that day itself but also announce the beginning of a new six-month period when each day would now grow longer than the night which had preceded it.

If we return briefly to Fig. 1, we will be reminded that this was a stunning phenomenon. The fact that the object seen in this illustration was carefully decorated with trefoil marks was no accident. It was the base of a gnomon, and its projecting piece (not seen because it was likely

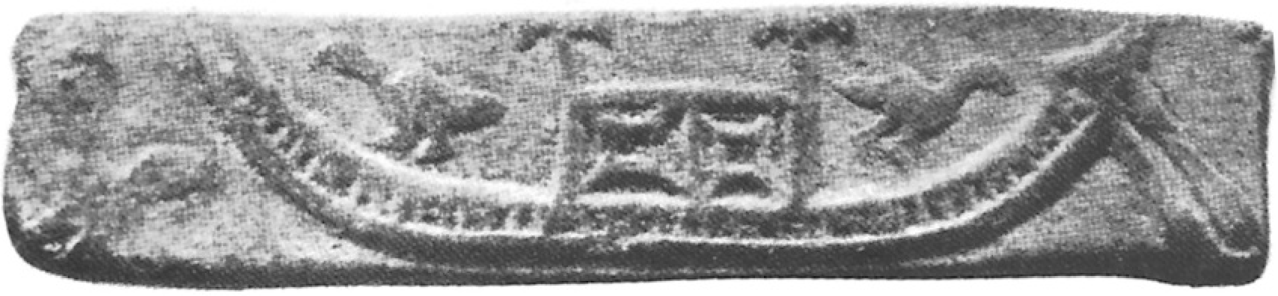


Fig. 27: M 1429 B

made of wood that decayed long back) was used to detect each year's two equinox days, one in the spring and one in the autumn. In sum, the gnomon and the Pleiades were linked. Both had a role in timekeeping that was directly bound to the sun's seasonal movements. It is relevant to remember that the Pleiad-on-earth in the Annanmar story, Tangal, was similarly powered by her dreams. These visions could also 'predict' future events, just like a gnomon could predict the changing course of the sun and the arrival of a new equinox day.

Fig. 27 shows the basic form most boats took in the era when the Pleiades served as the main sailing compass. Birds are shown on this boat because they, too, were important. They were welcome passengers that sailors used to help them assess their location when they could not see the land. They would let a bird loose if they suspected that the shoreline might be close by. If the bird did not return, that would confirm their suspicion. Thus, birds served a practical navigational function. The small hut at mid-ship was useful as well. It was a way to escape the direct rays of the hot noon-day sun, and it also helped to protect sailors from the sharp cold winds that blew at night. This leads us to ask whether the sailors from this early period left us any further clues about their navigational habits, especially any clue to their interest in and respect for the Pleiades cluster. So far, I have only found two bits of possible evidence, but both are of interest. This first is suggestive of the idea that some boats had a type of built-in shrine that they placed on the side of their small central hut. A row of seven small triangles seen here is located near the roof of that hut, and it may have been meant to honour the Pleiades. Even today, Shrines to the Krittikka in the Kongu area are normally made of seven small quartz rocks set in a row (often white quartz that glistens in direct sunlight). We see here just such a row (an upper line shown within the red rectangle). Sailors likely had this carved into stone or wood to prevent any shifting of these seven triangles, even when high waves or severe winds were encountered. The second, lower row, is more difficult to understand. Maybe this was the case that sometimes six were seen rather than seven Pleiad stars. But it is more likely that the row of six may have referred to a different story, one where the Pleiad girls were originally married to seven famous sages, but six were later wooed away by Lord Shiva (acting in disguise). One girl (Arundathi), remained faithful but the other six were rejected by those sages because, they were not careful enough and hence got caught in Shiva's amorous trap. Those six were forced to leave the great Bear constellation (Ursa Major), where they had been (chastely) residing with their austere husbands, who were always in meditation. The story says that they took refuge in the Pleiades star cluster and stayed there forever after.

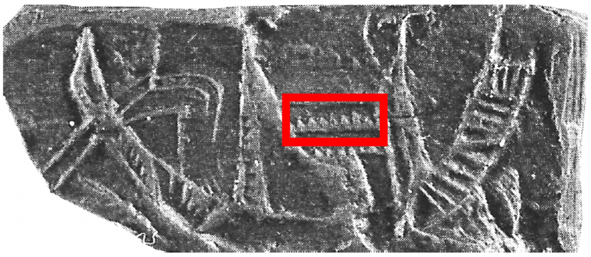


Fig. 28: M 1349 a bis

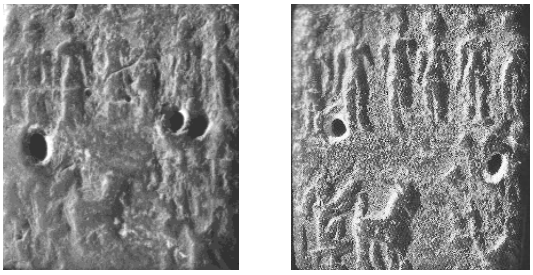


Fig. 29: M 442 B (seven figures) and M 442 A (six figures), otherwise similar

The tradition just cited generally says that the six ladies whom Shiva flirted with later fled from their angry husbands and found refuge in the star-cluster where they could exist independently. But there is still confusion here because these women, supposed to have been six after their misadventure, continued to be called the 'seven' or Sapta Matrika. I don't think it is likely that these seven 'Matrikas' are really the same as the Pleiades seven, because the Pleiades are always said to be unmarried and to never have had any children of their own. Those six, on the other hand, though they are highly respected as the six nurse-mothers who cared for Murugan, (Skanda, Shiva's son) after his birth in a lotus flower that emerged from a lovely pond. One further IVC seal (Fig. 29) displays seven female figures on one side and six on the other. This may constitute a second reference to the same Sapta Matrika story that is possibly referenced as six triangles in the lower row carved on the hut of a boat (Fig. 28). But there is no clear literary reference to the existence of the Sapta Matrika prior to their mention in a few select chapters of the Mahabharata. There were Seven Sages who were clearly important in Mesopotamia, but there those seven are never described being married or even linked to women in any way. Thus, it seems that the Sapta Matrika story may stem from a separate mythical tradition and that the story of their leaving the bear constellation and joining the Pleiades was a way of representing a merger. Furthermore, the Sapta Matrika are often pictured as having children in their laps and/or as riding various animal vehicles or carrying different emblems in their hands, none of which aligns with descriptions of the Kannimar. By contrast, the Kannimar are able to fly of their own accord and are said to cross the ocean in this way, as mentioned in several poems about them that I have collected. Perhaps there was a merger of two quite different story traditions represented here that intermingled in the IVC area. But whatever happened there, the possible 'merger' of the Krittikka or Pleiades story with the Matrika story in the Indus Valley area was not something that then spread to Babylonia, where (to my knowledge) there is no Matika tradition. This difficult topic must be left aside at this point. Hopefully, it will one day be further explored by others.

The other boat reference that is useful, which I have found, comes from an undocumented source, as far as I have been able to search. Even so, this image is definitely worth mentioning here. I suspect this may be a graphic representation of an early IVC ship flag which can help us to decipher other IVC seals. Note the seven vertical strokes that precede here is a 'bent' triangle (reading right to left) (Fig. 30). The triangle seems to soften and 'wrap' itself around the end of

those strokes. I have found six IVC seals that display a graphic sequence similar to what appears on this likely flag. Three of these examples are shown in Fig. 31. I suspect that the frequently depicted seven stroke motifs, refers to the Krittikka lineup discussed above. At the left end of each such sequence we could see the very common concluding symbol, one for a jug or vase. Sometimes the jug is augmented by one, two or three short lines at the 'mouth' that seem to indicate a seed or seeds entering it from above. I like to call this symbol as the 'prosperity vessel,' a motif or graphic element associated with many different seal sequences. While the meaning of this motif will not to be explored further here. The sign does appear to be an ending, perhaps a kind of blessing, that suggests fulfilment, well-being and possibly also communal sharing for the greater good. What is of real interest is the triangular tower that begins that repeated line up. I think this grapheme may refer to a sacred spot of some kind, likely in the sky. Quite possibly it refers to the sun itself, an entity that shines its rays downward and energizes the Krittikka star cluster. If it does refer to the sun's rays, then we can guess it as just having risen above the horizon (the triangle's top point) from which it looks down. At the beginning, its light is soft and gentle like the light of dawn itself is soft and bent, similar to beam of light, the rays then widen as its light travels away from the source and gradually brightens at the same time, as do Inanna's ribbons. Perhaps this triangle refers to an adjective or verb that was used

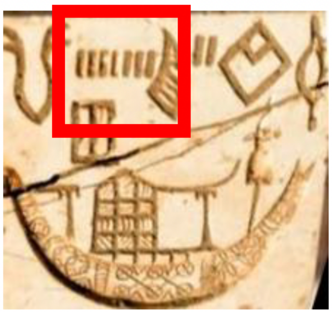


Fig. 30: The original source for this image is unclear. It comes from https://x.com/ Vritrahan2014/status/ 1836689248080007506. It has been reversed, by me, to allow for a right-to-left read

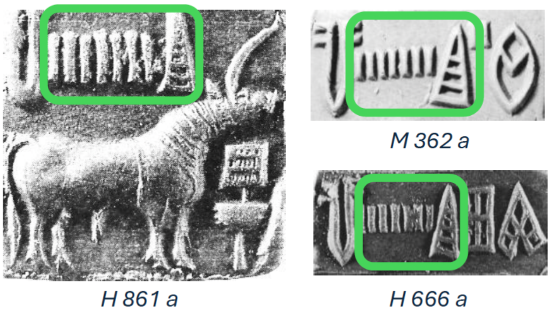


Fig. 31: Three of six seals that show the grapheme sequence marked in green, that matches what is shown on the flag shown above

to describe the gentle faces of the seven Pleiades as they set out, as a group, to guide travelers to their wished-for destination. That would be an idea appropriate to a ship's flag! Whatever the case, the result seems to be the refilling of a 'vessel of prosperity' at the end of the sequence. In the first example shown in Fig. 31, the same motif appears not above a ship, but over the back of an animal, the 'unicorn' (H 861 a). Both entities thus appear to be in the progress of receiving a blessing from a 'dawning sun' that sits high above. The other two seals seen in Fig. 31 would thus constitute a more abstract reference to the power of a new day and the blessings it was hoped to bring.

In a second, slightly different layout, there is a usage I have found in only two examples. This is of the seven strokes under discussion where they have not been linked to an adjacent triangular

shape (Fig 32). Here, both examples occur over an animal's back, in the first case a markhor (B10) and in the second a unicorn (M1775a). In the case of the unicorn the seven strokes (shown with a green arrow) are enclosed in brackets. Brackets are rare and do not appear to have much meaning, except to indicate, perhaps, that all seven young girls are standing or working together without interference. Both images place these seven strokes over the back of an animal, probably suggesting that the star cluster is shining down and guiding or helping that beast in some way. In the first case the markhor stands over what looks like a three-pronged post. It might indicate that he is worshipping, serving or supporting a tripartite goddess, perhaps via an earth-based shrine that is dedicated to her. As an aside, this three-pronged post bears an eerie resemblance to the post set in front of the Mariyamman shines in Kongu Nadu today. See my 1981 article for more information on this topic. In the second illustration, M1175a, there is also a 'vessel of abundance,' at the left end of the sequence, basically identical to the three seen above in Fig. 31. But this time all seven sisters are assisting the unicorn directly, a creature who is surely their devotee.

Here, these seven are without the backing of the triangular beams of a rising sun, perhaps because this scene occurs at night is intended to depict the night sky where the Pleiades can be clearly seen? The unicorn motif is controversial and needs discussion in a separate paper, but I

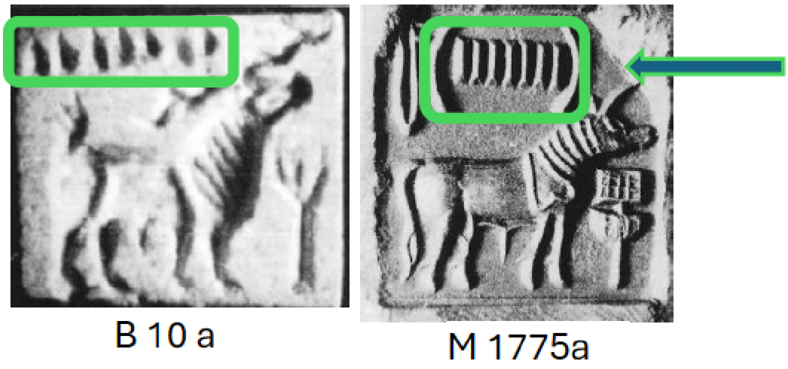
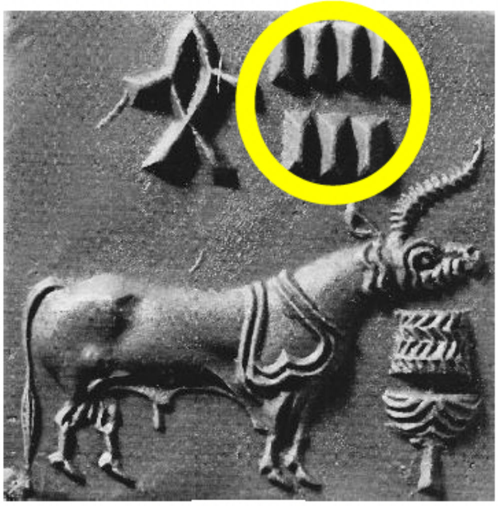


Fig. 32: Examples where there are seven strokes in a row, but no triangular tower is associated with them

think it is likely a symbol for a chaste, well-disciplined devotee that is caring for and guarding a communal soma filter (seen in the bottom right corner). A few well-fired earthen pots also exist in this marvelous Indus collection of artifacts and there are examples of a very similar set of seven horizontal adjacent strokes incised near the pot's rim. The interpretation in this case seems easy: those strokes represent the Pleiades in their role as guardians of the pot's contents. Since a pot is in any case, a ready metaphor for a womb, the Pleiades are only doing what comes to them naturally ... guarding a great storehouse of seeds, or other valuable substances, yet to see the light of day.

It is worth noting that the unicorn motif appears repeatedly in Babylonian artwork, and not just on IVC seals. There, it takes the form of a unique, one-horned bull-like creature that can

be seen (Fig. 9), pulling a plough while the Pleiades look on overhead. Otherwise, he is prancing or flying while the Pleiades are again watching over the scene carefully (Figs. 15 and 16). In Fig. 16, this same Bull of Heaven is gazing or perhaps even romantically eyeing(?), the Pleiades' fire and heat. In South Asia, the bull is closely linked to Rudra (and his successor, Shiva), two divinities who both have a strong bond with the Pleiades as well. All three are also linked to the moon, which is also noticed in many of these scenes. It is certainly interesting to notice that the connection between the Bull of Heaven and the Pleiades appears in both ancient Babylonia and is still important across South Asia to this day. The moon, of course, still visits the mansion of the Pleiades once every month.



H 9 a

Fig. 33

When it comes to Indus Valley seals, I have specifically looked for similar graphic equivalents to the number seven, and also for the references to heat or fire. This is because, I believe it is likely that the Pleiades will be referenced in such contexts. Identifying seven adjacent vertical strokes is an obvious place to begin, and Parpola has already suggested that a series of such marks may reasonably represent a number consistent with such a stroke cluster. Then, I noticed that 'seven adjacent lines' is a motif that comes in two different forms. I have already mentioned the first type above, the form less frequently seen. The second design is more popular, and it is also highly reminiscent of Babylonian graphic traditions, where seven lines laid out in the two adjacent rows was common, almost universal way of depicting the Pleiades. Yes, one sees just two rows in Babylonian designs depicting these seven sisters, but with a little imagination one can easily image that in the Indus version, this was just a codified or formalized way of indicating what the Pleiades actually looked like in the sky, a roughly almond-shaped womb. With very few exceptions, the top row on Indus seals, using this motif always consists of four strokes, and the bottom row of three. I particularly like the seal shown in Fig. 33 because, it is so simple. It just uses seven strokes, displayed in the formal sky-womb layout, followed by a fish, indicating that this star cluster is found in the sky above the unicorn's back. How elegant! Fig. 34 adds some more examples of Indus seals that present the Pleiades using this two-layered, womb-like design accompanied by a triangle that appears to shine light down upon them.

Finally, there is a very interesting example (Fig. 35) that also deserves mention. Here again we see the Pleiades motif laid out in two rows, preceded by a triangle, as above. But this time the

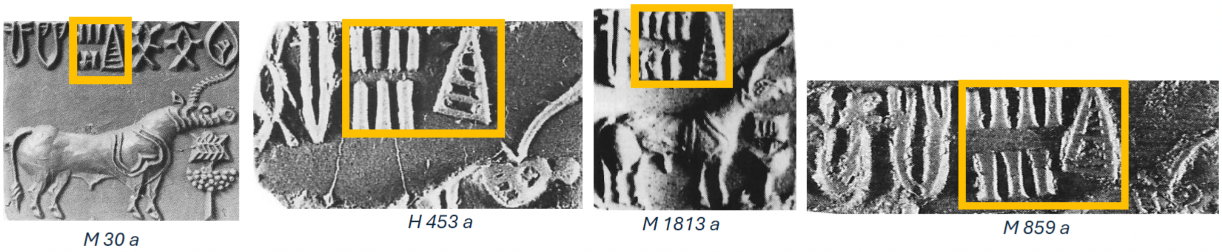


Fig. 34: Several more examples of the triangle motif immediately preceding the seven Pleiades motif, this time displayed in two rows

composition features not only the 'vessel of abundance' but also a cutter or razor at the far end, a second strong indicator of a Pleiades theme. However, the real item of interest is displayed on the reverse side of this seal (a helpful feature which not too many seals have). Here, we see a crocodile (H 174B), a symbol of life in the underworld. The crocodile is another motif that expresses an ability to undergo rebirth. Like a serpent, this creature can also shed its scales and thus reincarnate itself. Furthermore, if it wishes to, it seems there was a belief that a crocodile could rebirth creatures that it swallowed, at least I suspect as much. So, in this example, while the Pleiades help the goddess generate and nurse new life in the sky, the crocodile has a similar role in the world below. This constitutes one additional example, not just of the power of the Pleiades but also of how the reptile theme embedded in the Kongu Nadu Annanmar story in the form of a friendly cobra, appears to have also been familiar to residents of the ancient Indus Valley area some 5,000 years ago. For more information on the crocodile motif, see Parpola's discussion of this topic, in his 2015 Roots book, pp. 182-66.

There are many additional examples that elaborate on the importance of the underworld theme seen on Indus Valley pots. There are serpents frequently decorated on the rims or 'bellies' of

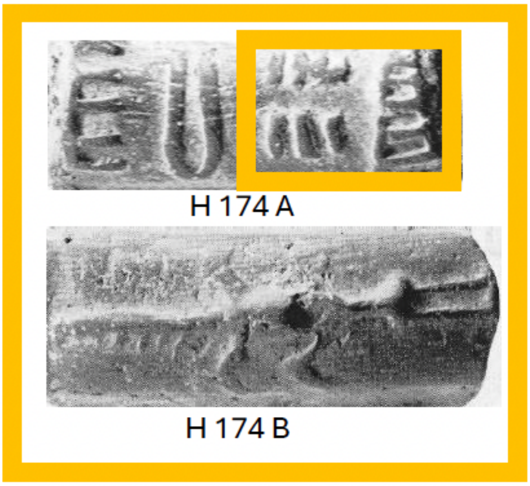


Fig. 35

such vessels, likely used to hold milk or (possibly) the all-important Soma liquid, a preparation that is extensively celebrated in Book nine of the Rig Veda. In Fig. 36, we can see the prominence of serpent designs on Indus pots. The serpent figures likely served an auspicious and protective role, guarding the community's most important liquids: those believed to sustain and renew human life in general. Also note how these serpent beings are featured as spiral bodies, that

Fig. 36: Indus pots that feature a serpent design

encircle the pot they are meant to protect. They appear to travel around the vessel in a predominantly anticlockwise direction (Fig. 36). If we consider the belief, common in Tamil Nadu today (and elsewhere in India too), that moving counterclockwise around asacred object is dangerous and understood to predict of an event of destruction. This might be communicating a protective warning: that disturbing the vessel it guards could bring about harm or misfortune.

This theme is also vividly illustrated in the Annanmar story, where a huge wild boar named the 'tusked one' (Komban) (Fig. 37 A), acts in a role largely parallel to one that serpents and/or crocodiles likely played in the Indus Valley area long back. Komban lives in a dark cave and is said to have a star on his tongue (Fig. 37 B). Because the heroes have been stealing from his forest, he circumambulates his own goddess of the forest, 'Black Kali,' in a counterclockwise direction (Fig. 37 C), and then he destroys their abundant crops at night, especially their ripe sugarcane field (Fig. 37 D). He does this under the cover of darkness. He also causes a great flood by breaking the dam that holds a large storage tank of irrigation water. That flood and the destruction it causes (Fig. 37 E) leads to his own death, caused by the huge spear that the twin heroes throw at him in their anger. But Komban's death and beheading is productive. After the great kingdom is destroyed and both heroes commit suicide, a process of renewal begins. Vishnu, in the disguise of a washerman, takes the boar's head to his wife, Bhudevi (Fig. 37 F). She appears to swallow it whole, driven by pregnancy cravings. Her desire for boar meat leads to the birth of a new yuga cycle and resulting in the complete renewal of the local lands where that fine kingdom had once flourished.

Next, we turn to another interesting correspondence between this local Kongu folk epic, and an IVC graphic symbol I think represents a smelter-style oven needed to convert rocks saturated with iron ore into fine iron rods. This was historically important discovery. It marked the beginning of a new technology and formed the basis for producing many

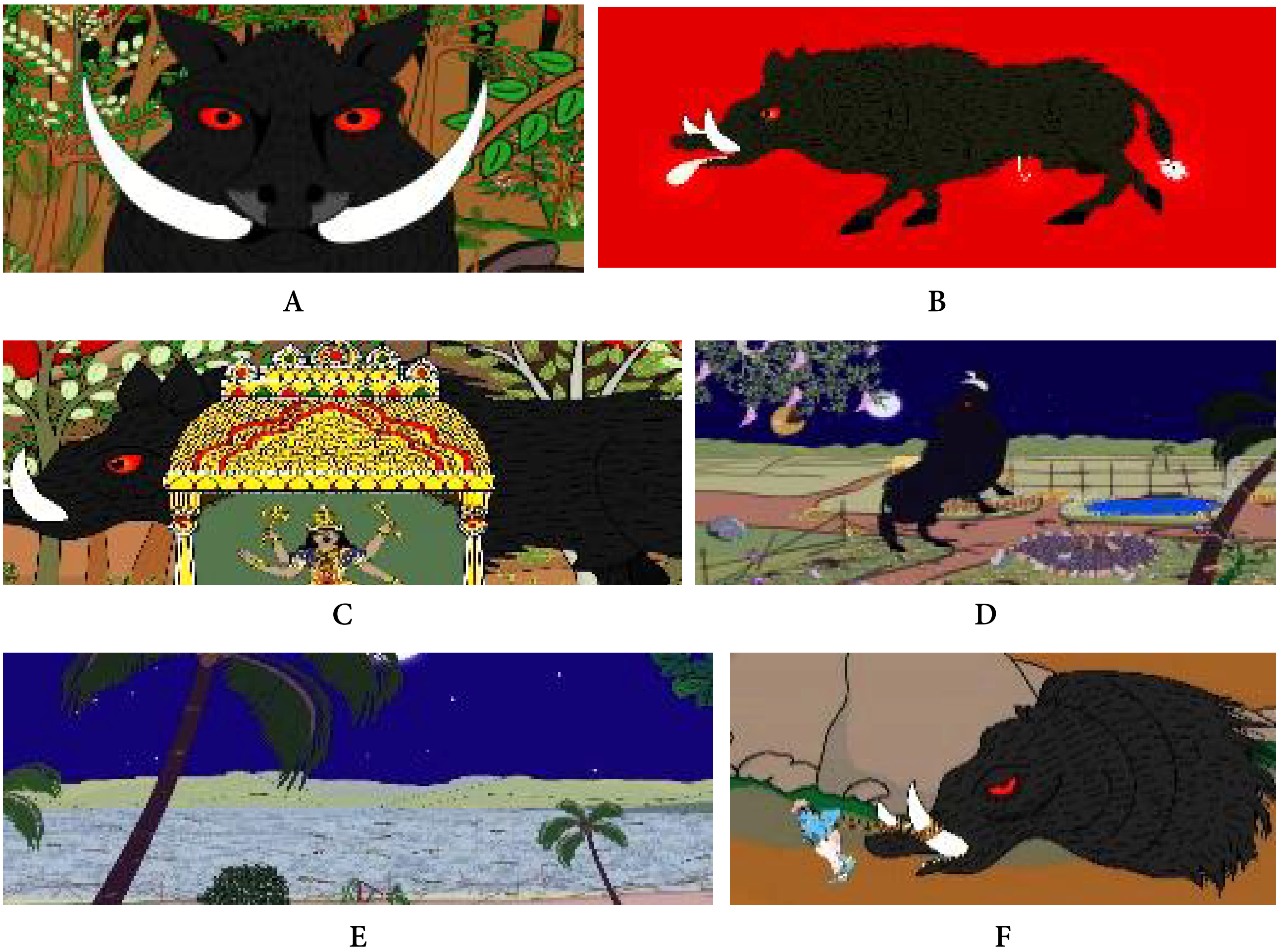


Fig. 37: The huge boar Komban (a serpent-crocodile parallel) acts as the primary force for destruction and subsequent renewal in the Annanmar story

important new, efficient iron tools including iron axe heads, iron plough tips, iron knives, iron spears, nails and more. This technological revolution had to come from forest dwelling groups that lived in mountainous areas where iron-rich rocks were available and could be collected, smashed and then smelted down. It was the technological discovery of how to build and heat a smelter oven that was key. The temperatures reached in that oven had to be much higher than what could be achieved over an open fire. The traditional smelter technology, likely developed by tribal groups living in the hills, was the key to this revolution. This involved creating a fire inside a thick-walled oven constructed of earth and "mud, and then force-feeding it oxygen by using a dual set of large forced-air bellows driven by foot pedals. Two teams of human pedal 'dancers' (pumping feet) had to alternately force air through pipes connected to each bellows' output. Two separate pipes and two vertical bellows were inserted into the thick wall of a prebuilt oven, allowing the workers to feed continuous oxygen in a syncopated, coordinated way. And those waist-high vertical bellows were further connected to seesaws, one end of which was designed to pull these bellows upward to allow them to fill with air, and then be compressed by releasing that tension, forcing them to collapse. As they fell back to earth, the air inside was forced through hollow pipes into the oven enclosure to 'feed' the fire. Atleast, two

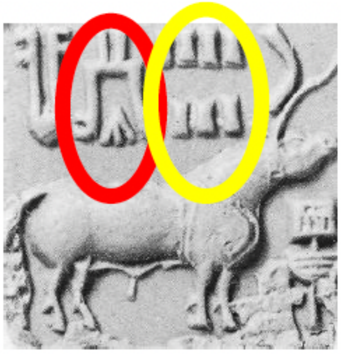
other openings were also needed to complete this innovative oven design. One added hole, near the top of the oven and allowed the workers to feed it with fresh iron ore and charcoal when needed. This same hole allowed the spent air that was being forced in through those pipes, to find an exit. But another opening at the base of the oven was required as well. This added hole allowed the liquefied iron being produced by heating iron-rich rocks, to escape. Small straight earthen channels were constructed that led away from the oven's 'mouth' for this purpose. The hot liquid iron would pour into those channels, and subsequently cool there. As a result, a team of workers was able to produce a freshly made supply of iron rods from the crushed stones.

An excellent ethnographic report on the Agaria iron smelters of MP (a Dravidian tribe) adds richness to this description and further describes this technology. Significantly, its description reveals two important details that provide us something more about Agaria beliefs, explaining how they understood both the power of their work as well as their unique social position. For one, they thought of themselves as rivals to the sun, their enemy. They built their ovens facing west, and in the shadows where the sun's rays could not fall on them. They also linked themselves to Raku, the deity that would swallow the sun during an eclipse. Instead, they also saw themselves as linked to the moon, where their most beautiful daughter lived, a place the sun could only visit on the day of the full moon, when she was said to be menstruating, because the moon's light was reddish on that day. The Agaria, however, had their own "midnight sun":their smelter-oven. They only worked at night, and they knew that outsiders considered them dangerous, believing that they had magical, and destructive powers. The Agaria were famous for their ability to control and divert the power of the sun, capturing its heat and light within their smelting oven. These ovens served as a jail or cage for the sun. Thus, one can surmise that the Agaria understood themselves as a kind of counterculture: a people blackened by ash, soot and charcoal, who worked only when the sun was asleep. In essence, they were asuras.

Secondly, the pair of workers tending a smelting oven had to 'dance' on pedals that resembled a set of side-by-side seesaws. Those two would stand together, one in back of the other, with one foot placed on one end of each of those two side-by-side balance boards. They would together depress each one rhythmically and alternately, using their conjoined body weight. That would, in turn, lift and collapse two large vertical bellows made of leather, one tied under the opposite end of each seesaw by means of a rope. As each board rose up in turn, its attached accordion-style bellows tied underneath it would be forced to expand upward, filling with air. When the weight of the two workers' feet then shifted to the other seesaw, that same bellows would fall earthward because the rope tied to it would no longer be stretched tight. So that end of the seesaw would fall downward, causing its sudden compression. That collapse then pushed the air that had just been drawn into it through a pipe leading to the smelter oven, where many iron-filled rocks were being heated to an extreme temperature by all the oxygen in that air. Most important, however, is that the two youthful workers doing the seesaw dance had to be a male-female pair. And the female had to be a young virgin.

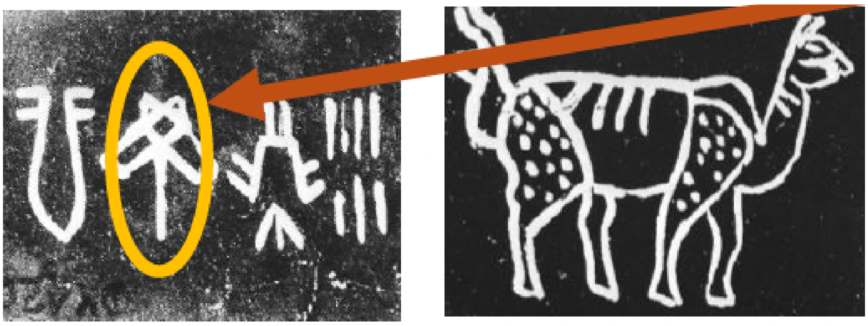
Fig. 38A

Fig. 38B



M 98 a

Fig. 38C



M 578 A and B

Fig. 38D

The Agaria believed that only when a pre-puberty girl helped pump the bellows could everyone rest assured that the iron rods being made would be strong and pure. I think these two ideas, taken in combination, match the Agaria's sense that they were special allies of the Pleiades and its star-shaped womb they could see in the night sky. That sky-womb was, in their eyes, a symbol of their furnace-like ovens on earth. Similarly, just as seven virgin star-sisters and their seven fires resembled their young girls, the Agaria would hide in the shadows of their forest trees during the day, protecting themselves (and especially their virgin females) from their adversary – the aggressive day-time sun.

Although the Annanmar story does not directly tell us that the forest rivals of that key plough-farming family in the legend were iron smelters, we do know that they stored large piles of iron rods next to their Black Kali temple for safekeeping (Fig. 38A). That important stash, cared for by their own virgin sister Viratangal, certainly seems to be an indirect way of telling others that this tribal group, called the Vettuvas, were busy with smelting activities. Fig. 38B allows us to look carefully at the symbol for the smelter itself. Its shape makes sense. Its basic form is that of a small house, slightly wider at the bottom than at the top.

This matches exactly the shape that photos in the Agaria ethnography show their smelting ovens looked like. The 'feathers' on each side would be where the air from the bellows entered through a tube, while the two upward-pointing lines at the top likely represent where fresh rock and charcoal were poured in and where the pressurized hot air could escape. Finally, at the bottom center of this grapheme, three conjoined lines show where the hot iron would run out, forming new iron rods as it cooled. Fig. 38C presents the same general design we have already encountered, in a layout that places the seven sisters beside this nighttime oven, high in the sky.

The whole design has been placed over the back of a unicorn and is followed, as usual, by a 'vessel of abundance' graphic mark. Fig. 38D is of special interest because, out of the 27 examples where I have found the first two symbols present (seven girls and a smelting oven), only this one has a second side. Furthermore, one extra symbol has been included on side 1 (identified by a brown arrow). I think this added grapheme expresses the idea of an entity (a social concept) with two sides. But the camel on the back of this seal is the real giveaway. It

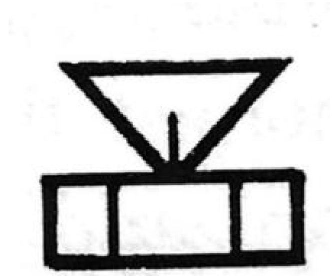


Fig. 39: Babylonian symbol for a shrine or honored seat offered to a divine female (a repeat of part one of Fig. 22).

has two heads. That may refer to the core principle mentioned above: that these tribal smelter workers always required a male-female pair when they needed to dance on the seesaws to force-feed extra oxygen into a hot oven. It is also possible that this same graphic might additionally reference the idea that some iron workers were not engaged in smelting at all but were instead blacksmiths. That group (or sub-group) would have added a second skillset—almost like a second arm on the same body, to their community: a group comprised of people who knew how to convert fine iron rods into useful tools.

Remember that earlier I identified the inverted or 'upside down' triangle as likely a female marker, especially (perhaps) linked to the idea of a female goddess (Fig. 39). I have now made another interesting discovery by examining graphic signs that appear as a set of three lines placed in a triangular array and are associated with a reference to fire. This motif is one that Parpola has tentatively identified- a set of three lines placed in a triangular array, a layout that resembles the upper part of the Babylonian motif shown here.

He suggests that this grapheme (see the examples in Fig. 40) likely refers to the common household fireplace. Three stone positioned to form a triangle is an universal feature of South Asian cooking hearths, as it easily supports a cooking pot, especially one with a rounded base.

A fire is then built beneath the pot. While I interpret this pairing somewhat differently than Parpola does, my perspective is not inconsistent with his earlier suggestion. I think what we might like to call the 'fireplace' sign is one that have significantly added meanings. First, as pointed out above, when a triangle sits on a kind of rectangular block, it serves as a sign for the female vulva. The rectangle beneath it, as explained earlier, represents the seat of a goddess, at least in ancient Babylonia. Here, I focus exclusively on the upper half of this symbolic duo, where the 'upside-down triangle made of three short vertical lines essentially expresses the concept 'female'. The fireplace easily links to this idea, of course, as women do much of the household cooking in South Asia. But I think the idea that this triangle referenced in the IVC context could be much broader and more abstract. I suggest that it may have symbolized 'the three aspects of the Great Goddess' herself, albeit in combination. Further evidence for this interpretation, I think, can be seen in Fig. 40, where in each example, two overlapping circles

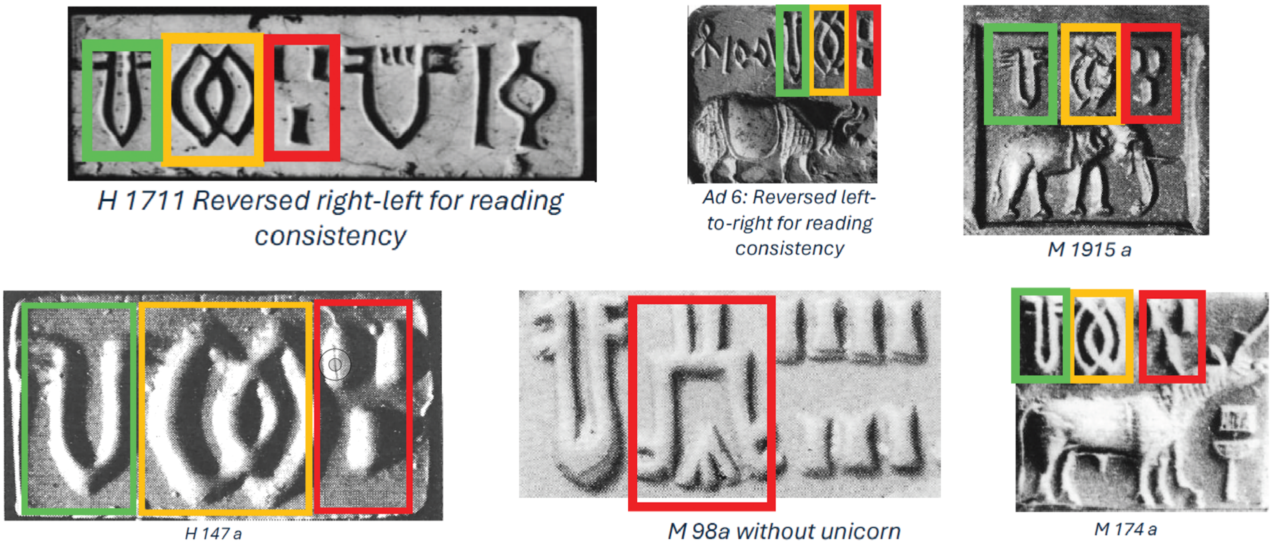


Fig. 40: Various forms of the Trivedi (or fireplace) adjacent to a set of overlapping circles

(outlined in yellow) are preceded and watched over by the goddess, represented by that triangle made of small vertical strokes.

The most likely and reasonable interpretation of this two-circle grapheme, I believe, is a double-embryo or double-seed concept (suggesting twins). One might even speculate that twins are a substitute or equivalent for the tripartite rectangular base seen just below the upside-down triangle in Fig. 40. In other words, it could refer to two male warriors, plus a magical female force backing them.

The difference would be that now, in the new setting I am about to describe, that rectangle might also be partitioned into two equal halves rather than three. The sign would then (in the IVC area, if found there) depict twin male deities— such as the Mesopotamian duo Mitra–Varuna, or the twin Aśvins of the Rig Veda, who are similarly described.

Twins were a popular and even magical theme in several Middle Eastern cultures of the time. They generally reinforced a larger idea: that twins may have very different personalities, but are inevitably bound by birth. They may occasionally clash, but society expects them to collaborate for the greater good.

In the Kongu folk epic studied here, we see a similar idea. A set of heroic twins—two men who reincarnate the *Pāṇḍava* brothers Arjuna and Bhīma—work together, albeit with some tensions, and with encouragement from the Pleiad maiden, who tells them they must cooperate. Although these heroes are most often praised as a male pair, there is always an unspoken third dimension: their sister is a goddess who descended from the sky to join them. The 'fireplace' motif on the seal being discussed may refer precisely to that hidden presence—that behind every heroic male dyad is a woman hiding in the shadows, with fire in her breasts, who lends them her secret power.

Also, in the same epic, we see *Viṣṇu* and *Śiva* teasing and jousting with each other, until Pārvatī (sister to *Viṣṇu*, but also wife to *Śiva*) steps in to mediate when tensions arise. I see this as a very

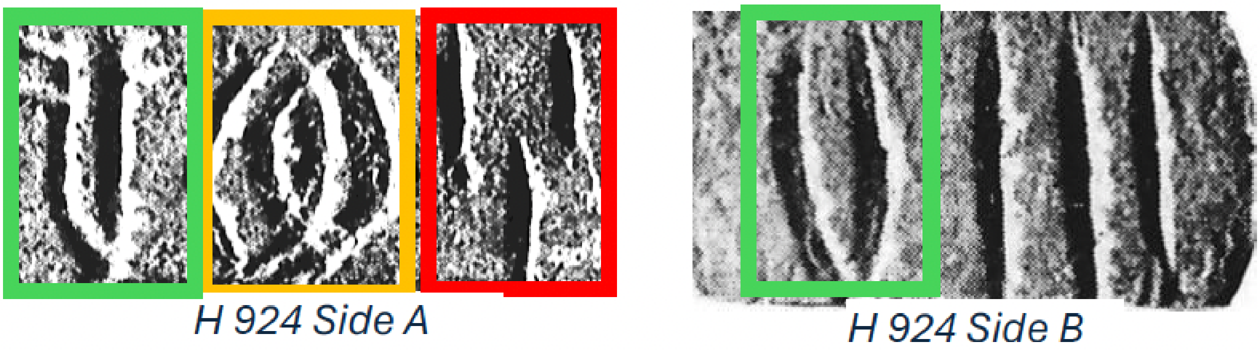
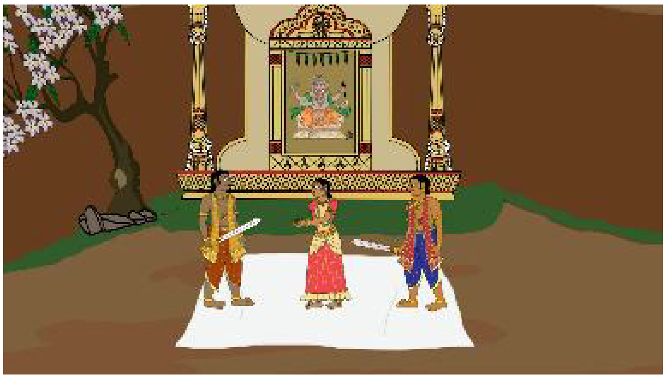


Fig. 41: Another version of an IVC triad that may reference a triad of deities who replenish the 'vessel of abundance'

significant theme, which reaches far back to the Mitra–Varuṇa pair in ancient Mesopotamian thought. Similarly, the Vedic male twins, the Aśvins, are supported by their shared 'sister-cum-wife', Sūryā, daughter of the Sun.

I now wish to introduce one further example of a seal with two overlapping circles placed adjacent to a Trivedi or three-goddess symbol. This is done to draw attention to the reverse side of the seal, as I believe both sides of this seal convey the same message even though the visual designs are quite different. Examining the second side of a seal can sometimes offer an (though is not always) alternative way of saying the same thing, See Fig. 41. In this case, the duplication may be helpful to others' research efforts to understand these same IVC graphemes. Many seals in this corpus display this same 'B version' of the fireplace, but in a more primitive way by just placing three vertical stokesside by side. Three strokes followed by a large U-shape, seem to essentially convey the same thing, especially because it is not unusual for the back of a seal to carry roughly the same message (or at least relate to) as the front, though expressed in a different way.

A



B

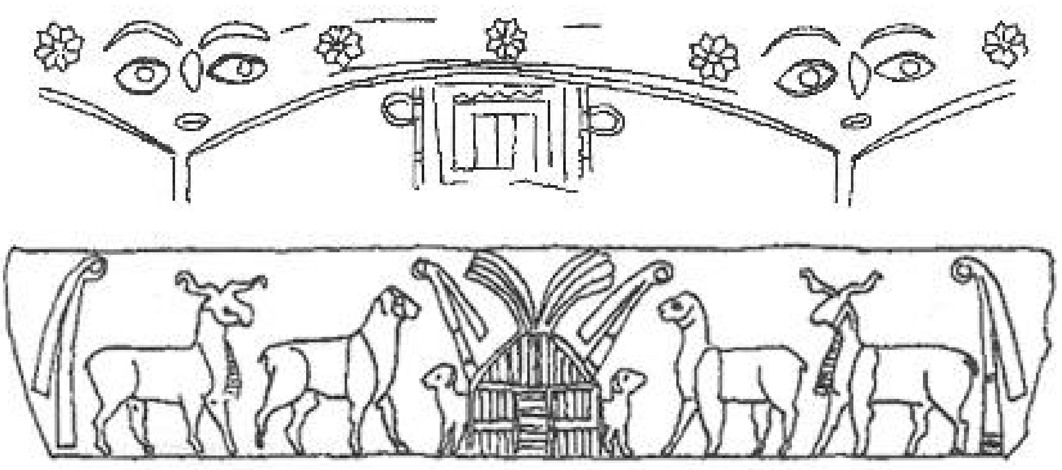
C

D

Fig. 42: Four scenes of the story's sister interacting in different ways with her twin brothers

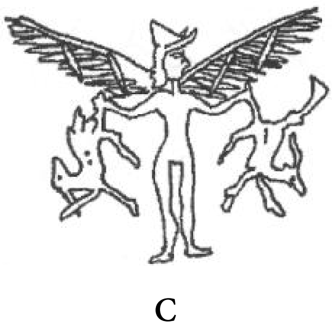
Below are a few images from the Annanmar story that convey roughly the same message as what we see on seals H924 A and B, though in a different and more contemporary way (Fig. 42). The four scenes shown here demonstrate that the ideas just discussed and explored in relation to Indus seals still resonate in Kongu Tamil folk themes popular today. In Fig. 42, scene A presents all three siblings in their divine form, as they were seen in 1965, painted on a local temple wall. The sister is seated in the middle as the earthly embodiment of the primary goddess Parvati (a name sometimes used for Tangal), while her twin brothers stand one on each side of her. There they serve as her ½ human ½ divine guardians. In scene B, she stands between her brothers, who have been arguing, and she is trying to mediate. Scene C, shows the same sister's subsequent dream during which she learns that her two siblings will never return from their final battle. Scene D, shows her brothers leaving the palace, saying they will fight and be home soon, but the sister already knows she must now tell them that she will never see them again. The broad point being illustrated is that the female role in this triad is to transfer the power of the 'fire' in her breasts to the men at her side, but also to act as a mediator and bring them together when they fight between themselves. She has an added wisdom, derived from her feminine dreams, that can help men to understand a larger picture, which only she can see clearly.

It is also important to say that the seven star-sisters, of which the sister in this epic Kongu legend is one, are still featured in the rural areas of this region today. Their presence is especially highlighted at the yearly pongal ceremonies where 'a pot of abundance' (the pongal pot) is always brought to a boil and shared, and where the seven star-girls are always seen installed in a small shrine dedicated to them that is placed at or near a small pond (the ocean in the sky?) dug and lined with cow dung expressly for this event. This patti pongal ritual, furthermore, must be celebrated not in a house but in the family's cattle pen (see Fig. 12 for the Babylonian version of this emphasis on the cows' place of residence). This celebration appears to link to the idea that calves (as well as humans) are first created-gestated in the sky and then brought to earth by some type of flying eagle or other large bird. Fig.43, shows this concept clearly as it was once depicted in visual terms by artists working in ancient Babylonia: A) The cattle pen watched over by the great goddess Inanna, B) the descent of a newborn calf to the cattle pen via a bird, C) the descent of two calves to the cattle pen helped by the winged goddess and D) Again, a winged goddess who also brings human children to earth.



A

B



C

D

Fig. 43: Four Babylonian illustrations of the descent of both new-born calves and new-born humans from the skies to earth, with help from the goddess Inanna or her bird-like assistant

Fig. 44: Four depictions of the seven sisters on earth, at a Kongu pongal celebration or in a Kongu temple

The idea behind the Kongu pongal celebrations appears similar to the sketches just discussed. At a patti pongal event, the seven sisters are installed as small quartz stones at or near the edge of a pond that likely represents the great ocean of the sky. Those sisters have a large cobra hood placed over them (or sometimes just imagined as hanging over them), in an outdoor setting, Fig. 25 E provided an example of the same concept, only this time the cobra hood hovers over the story heroine Tangal, herself. A cow from that pen in which the patti pongal occurs is first highly decorated (as if going to its wedding). She is then asked to either jump over (or to walk across) that little pond and she must break a small vegetal rope as she goes through it. This suggests that this cow is on a journey back from earth to the sky (where she first came from as a babe) to now undergo impregnation by the great sky bull. In one case, I even saw that key cow being further decorated by having a male human's two key garments (a veshti and a shoulder towel) placed on her back before making that crossing. And much attention is paid to her rear end as well. It is offered flowers, turmeric etc., just as is her head. This is surely a way of saying, in ritual terms, that the human family's cattle pen is about to be re-fertilized at the time of the Makar sankranti or winter solstice. Below, in Fig. 44, we see just a few images of this festival, one where the seven sisters are celebrated and displayed with a cobra hood over their heads. Fig. 44 B is an especially nice example, because we see that in an outdoor setting, the hood has been replaced by a beautiful woven mat and flower garland. Meanwhile, seven tiny quartz stones (framed in red) have been placed at its foot.

Fig. 44 D is of special interest, because there we see the very direct connection between these seven sisters and the pongal pot or 'vessel of abundance' painted on the frame of their shrine (also framed in red). The reader will recall the many pots from the Indus Valley, shown earlier, where serpents are seen wrapped around a similar kind of sacred vessel, seemingly a concrete way of saying that the pot in question (when filled with liquid amrit obtained from the sky), symbolizes the birth of new life and therefore requires protection from potential evil-minded thieves or intruders. The seven sisters of the sky are similarly seen to encircle that dark black hole in their midst in a similar way. And we know that they are responsible for nursing and helping those new embryos believed to periodically emerge from it. They are the seven who help these tiny entities get a fresh start in life. Fig. 44E is included to illustrate that even a very old terracotta image of these seven sisters, found at the back of one local temple, had a tiny cobra head hovering over these seven young girls, charged with aiding and protecting them during their travels through the darkness of the night while crossing the great sea in the sky. Furthermore, the pongal ceremony is said to be at its best, when performed in the very early morning just as the solar rays of a new day begin to peek over the Eastern horizon. All the rituals performed during a pongal event are deliberately oriented in that direction.

In conclusion, it remains to address the very obvious question of how such extensive ties between ancient Babylonian traditions, Indus Valley pots and seals, and the relatively modern Annanmar folk epic could all be connected. The contemporary Tamil folk celebrations in the cattle pens of Kongu Nadu also beg for a related explanation. I believe the answer to these questions is quite simple: there was much more significant early contact between these three areas by boat than we have direct records for. The Tamils were well known in the Sangam literature as skilled sailors, and the earliest of those records date from roughly the same time (or just a little later) than the equivalent records from Greece that document this connection.

Also, record numbers of Roman coins have been found in and near Karur, an important ancient town located on the edge of the Kongu area. A few Greek coins have been found there as well. I believe that early boat travelers must have plied between all three of these locations long before we have any written records, than surviving written documents describe such journeys. The earliest reference, mentions a Greek named Scylax of Caryanda, who left a logbook describing his sailing adventure down the Indus River and then to Suez. It is said that his travels were financed and politically supported by the Persian King Darius I who reigned from 522 to 486 BCE.

However, I suggest that such explorers and traders, men who moved around easily by boat, likely started to explore the east coast of the Arabian sea well before these written records appear, possibly even on or before 2,000 BCE and that several of the cultural themes described above traveled along with those adventurers. I also suggest that the port of Muziris, on the Kerala coast, was likely of special importance as it was situated right at the sea terminus of a major trail leading across the Palghat pass.

This was a key route to the interior and sailors could easily have noticed that mountain pass, which is quite wide and flat, even while sitting on a boat floating along the Arabian/Malabar

Fig. 45: Map of Greek trading routes dating back to roughly the first century AD Source wikipedia.org/wiki/Periplus of the Erythraean Sea

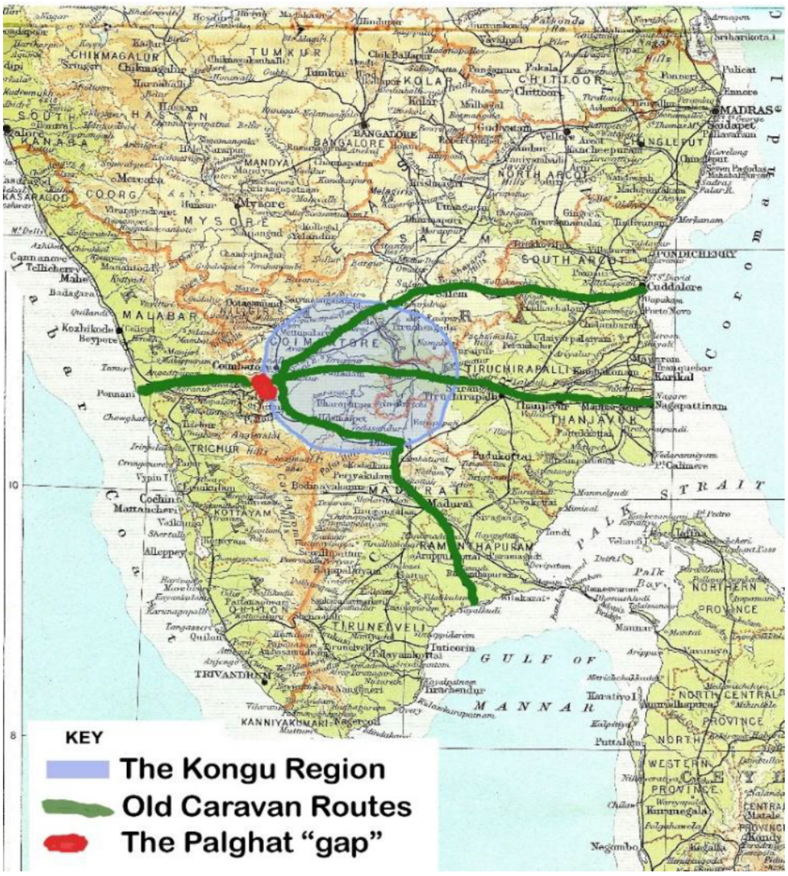


Fig. 46: Map of Early Tamil Trade Routes to the interior that connected, by sea, with far-away lands (hand drawn thanks to conversations with Dr. Jagadeesan, R., epigraphist, Coimbatore.)

Fig. 47: A celebration of the Kannimar or seven sisters witnessed in 1965, in the Kongu area; author's photo

seacoast. This path was used by many traders interested in accessing South Asia's continental interior, because it led, in gentle stages, right through an otherwise very challenging geographic barrier, known as the Western Ghats. After all, the importance of the seven sisters had seemingly spread to many parts of the world at least by 2,000 BCE and that must have happened by boat because they are seen as important in both New Zealand and in North America.

The Pleiades constellation is not so prominent or remarkable that its admiration would have independently evolved in places so far from India, where there is no land connection. We do not give early sailing adventurers nearly enough credit. Because of the prominent and well-known seasonal shifts in wind patterns, it would not have been difficult for these so-called

primitive' sailors to have arranged to largely float (and/or sail and paddle) around the edges of the Arabian sea, or even across it. They could then have returned when the winds changed direction, predictably, according to the season. Unfortunately, however, the underwater drop off at the Western edge of the Indian peninsula is steep. Furthermore, sea levels have risen and washed over many early seaports, making the need for highly technical underwater archaeological exploration vital. The powerful sea currents that race along the East coast of the Arabian sea also make the discovery of new, ancient underwater artifacts there unlikely.

Despite difficulty in finding underwater evidence, I believe that there must have been early sea contact between Mesopotamia, the Indus Valley and South India via ports like Muziris. The extensive cultural evidence from the Kongu Nadu, appears to show that. But for now, at least, we must leave the task of exploring this significant possibility of cultural sharing to artifacts and traditions we can locate on land. What is new about this paper is that it has relied heavily on folk evidence, and folk legends. By using that approach, we have been able to discover much that is both novel and thought stimulating. Many discard folk evidence, as marginal and inferior, because these largely written texts describing such traditions lack in nature. There is surely much more to discover by pursuing this less trodden path more fully in future years. There is much more we can hope to learn from it.

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Source reference for each illustration

1. Parpola, 1985, Fig. 9A

2. Parpola, 2015, p. 232

3. Parpola, 2015, p. 233

4. White, 2014a, p. 230

5. White, 2014a, p.188

6. White, 2014a, p.189

7. White, 2014a, p.187

8. White, 2013, p. 174 where he states that the Pleiades is the only

recognisable constellation in ancient art.

9. White, 2014b, p.119

10. White, 2014a, p. 270

11. White, 2013, p. 50

12. White, 2014b, p. 125

13. White, 2014a, p. 269 and White, 2014b, p.153.

14. White, 2014a, p. 141

15. White, 2014b, p. 20

16. White, 2014a, p. 46

17. White, 2013, p. 120

18. Open source, 6th century image of Lajja Gauri, Metropolitan Museum of Art

19. Parpola, 1991 – 2010 seal corpus

20. a) Parpola, 2015, p. 233, d) Harappa.com/painted antelope dish plus Parpola, 1991 – 2010 seal corpus

21. Parpola, 1991 – 2010 seal corpus

22. White, Queen of Heaven, p. 83 and White, Starlore, p. 193.

23. Parpola, 1991 – 2010 seal corpus

24. Cover of book Determinism in Sramanic Traditions. International School for Jain Studies & D.K. Printworld

25. From the author's files used to animate the Annanmar story

26. Neumayer, illustration C428, plus other illustrations from the same work

27. Parpola, 1991 – 2010 seal corpus

28. Parpola, 1991 – 2010 seal corpus

29. Parpola, 1991 – 2010 seal corpus plus a discussion of the Sapta Matrika by David Kinsley, (1998) Hindu Goddesses: Vision of the Divine Feminine in the Hindu Religious Traditions, p. 151.

30. The original source for this image is unclear. It comes from https://x.com/Vritrahan2014/status/1836689248080007506

31. Parpola, 1991 – 2010 seal corpus

32. Parpola, 1991 – 2010 seal corpus

33. Parpola, 1991 – 2010 seal corpus

34. Parpola, 1991 – 2010 seal corpus

35. Parpola, 1991 – 2010 seal corpus

36. Indus pots advertised in 2023 on the internet: A) Indus Valley Snake Bowl, 3500 BCE - 2000 BCE barakatgallery.ed. I believe examples B, C, and D were obtained from the same source but are now no longer accessible online.

37. From the author's files used to animate the Annanmar story

38. Image A is from the author's animation files; B is her sketch; C and D are from Parpola,1991 – 2010 seal corpus

39. White, 2013, nos. 8,10 and 11 in the chart on page 184.

40. Parpola, 1991 – 2010 seal corpus

41. Parpola, 1991 – 2010 seal corpus

42. A is the author's field research photo from 1965, B, C, and D are images from her animation files

43, White 2014b: A pp. 40 and 125, B p. 41, and D p. 42 plus C from White 2013, part of the illustration seen on p. 60.

44. A,B,C,D, and E are all this author's fieldwork photos.

45. A is an image from wikipedia.org/wiki/Periplus of the Erythraean Sea.

46. A hand-drawn map by the author after conversations with Dr. Jagadeesan, R., epigraphist, Coimbatore.

47. A photograph from the author's field research in 1965.

Hampi Tunga - Bhadrar River Basin Cave Rock Paintings Resemblance to Indus Seals

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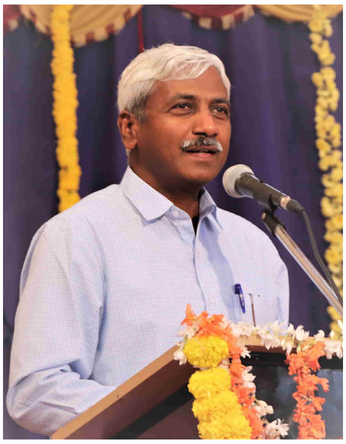
Kannada University, Malapanagudi, Hampi



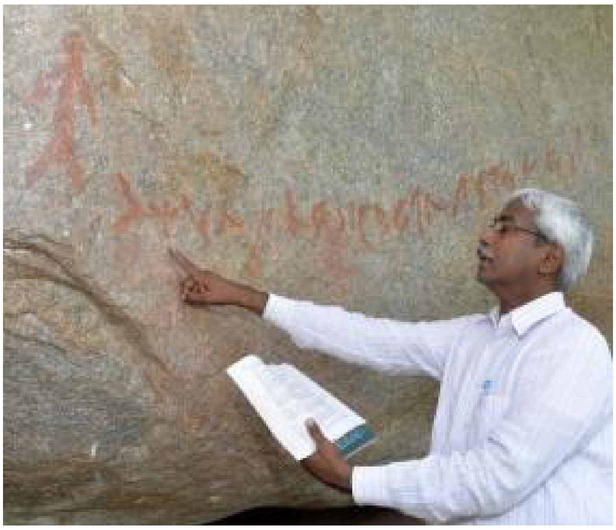
Prehistoric cave paintings are vivid and mysterious survivals from some of humanity's oldest art. Prehistoric rock art (paintings and carvings on permanent rock locations like caves, boulders, cliff faces, and rock shelters) are some of the most fascinating artworks. They represent the earliest surviving evidence of the indigenous people's totemic artistic instinct in early humanity and have been found in nearly every continent.

In India, rock art sites have been reported from rocky landscapes comprising sandstone or sedimentary rocks. These landscapes are primarily in the Vindhya, Cuddapah, Kaladgi, and Bhima basins, and Satpura and the Aravalli ranges scattered over the States of Madhya Pradesh, Karnataka, Andhra Pradesh, Odisha, Uttar Pradesh and Rajasthan. The highest density of these sites is in the Vindhya ranges in Madhya Pradesh and its Kaimurean extensions into Uttar Pradesh. A considerable number of sites are also present in the granite hills of peninsular India. These areas include the States of Andhra Pradesh, Karnataka, Maharashtra, Gujarat, Rajasthan, and Datia district of Madhya Pradesh. However, sandstone and granite pockets stretching from Ladakh, the Zanskar valley in the extreme north to Kerala in the south, and from Odisha, Assam, and Manipur in the east to Gujarat in the west are known to have rock art sites.

Kotamba: Ancient rock paintings and carvings are abundant in the caves and rock formations of the world-famous Hampi area of Hospet taluk in Vijayanagara district of Karnataka.

One such cave features the Gondwana Royal emblem on a rock within the Daroji Sloth Bear Sanctuary, while another notable site is the Kotamba cave near the Talari (Talavar) Ghat gate. This cave is located on a hill near the banks of the Tungabhadra river, adjacent to Anegondi. The Department of Tribal Studies, Kannada University, in collaboration with the Central Institute of Indian Languages, Mysore, organized a national seminar/workshop on the 'Standardization of Gondi Vocabulary' from August 24 to 29, 2014. Resource persons with knowledge of the Gondi language and culture from Telangana, Chhattisgarh, Madhya Pradesh, Maharashtra, and

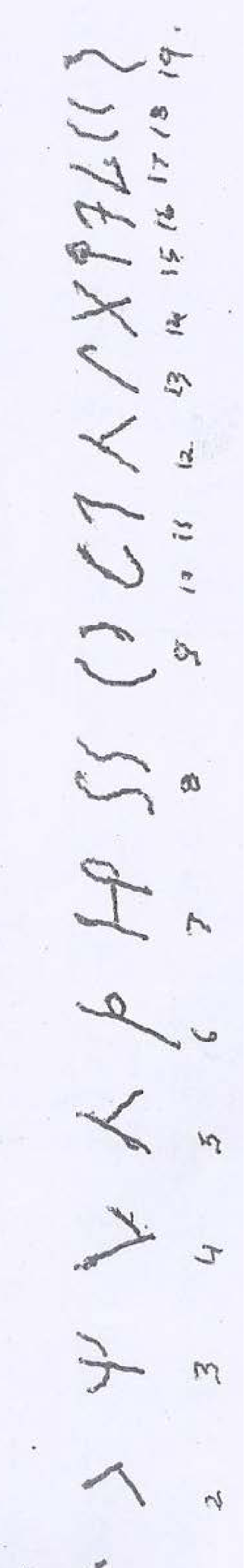
Karnataka participated in it. On this occasion, field visits were conducted in Daroji and Hampi surroundings on 28.8.2014. The valuable data obtained during the fieldwork is as follows. The study team visited the Kotamba cave temple on August 28, 2014. Prakash N Salame from Maharashtra, was moved to tears of joy on seeing the rock paintings. Interpreting the artwork, he declared in Gondi that this was a treasure of the Gondian ancestral home and identified it

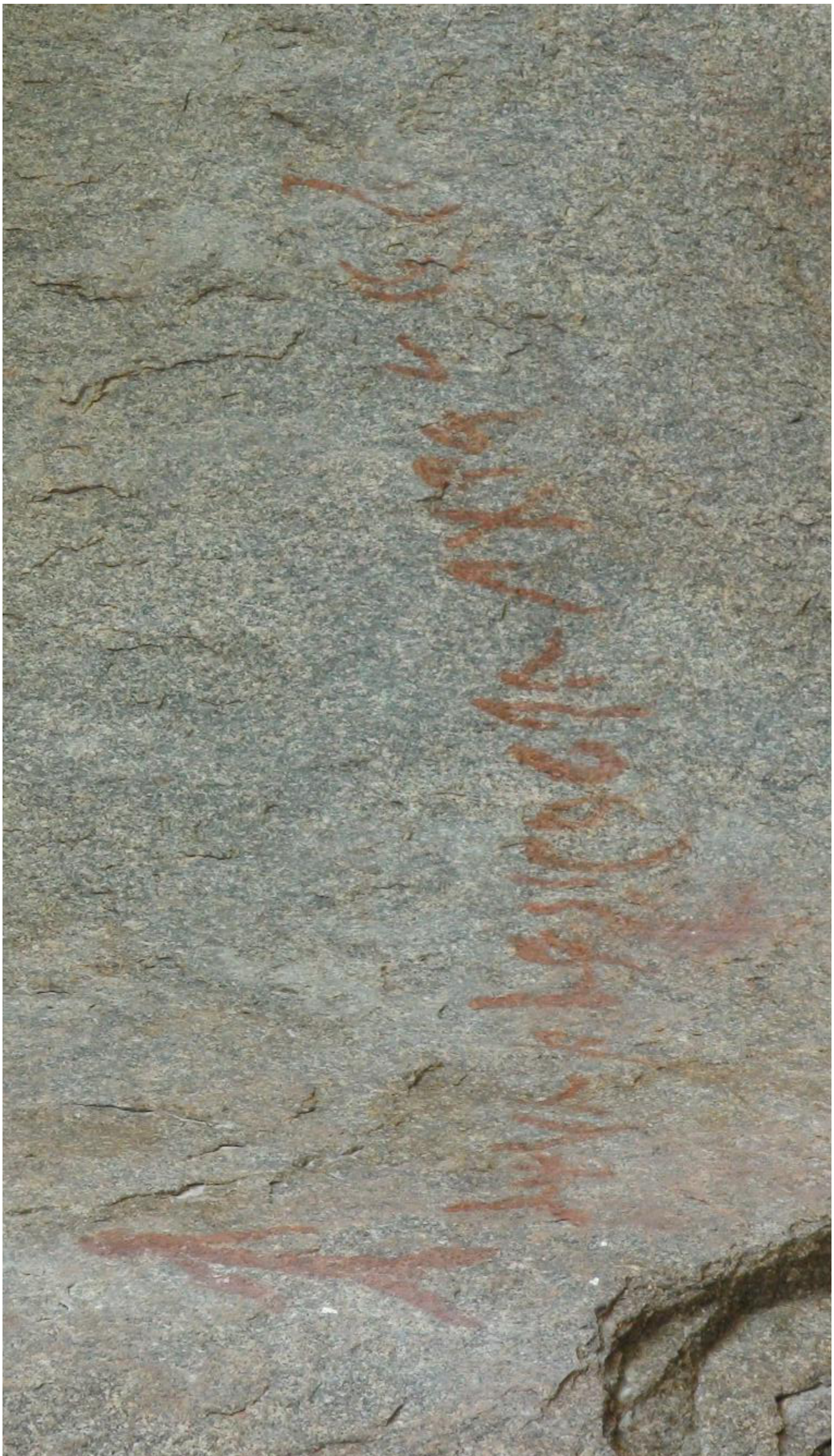


as the script of the Indus Valley. Resource persons from Madhya Pradesh and Chhattisgarh attempted to compare the paintings with those found in their Gotul. Unfortunately, Dr. Motiravan Kangali was unable to visit the site because he could not climb the steep hill. However, upon viewing the photographs of the rock paintings, he too was deeply moved and clarified that these paintings closely resembled the Saindhavi (Indus) script.

A sketch of ancient rock paintings in Hampi

- This is a pictographic script written in color on a huge rock; it is older than even the syllabic script.
- The pictographs of this script No. 1,2,3,4,7,8,9,11,13,14,15,16,18 & 19 are similar to the pictograms of the Indus script (Resemblance to Indus Script: See References).
- It is possible to decipher this script by means of the root morphemes of the proto-Dravidian languages.
- Linguists Robert Caldwell, Jules Bloch, Professor Rajeshwaraiah, and other scholars are of the opinion that Gondi is a pre-Dravidian language. By identifying the pictographs depicted on the above-mentioned rock, I have tried to read these pictographs by Gondi language through its root morphemes as follows:





Mothiravana Kangali has studied and interpreted the 19 rock paintings found in the Kotamba caves of the Hampi area as follows:

Decipherment of Hampi rock paintings		
1		This is the rock painting of a mother, which is pronounced as Yaayaal or Avvaal in Gondi language; it means mother, mother deity. Amma, Amba, (Kotamma/ Kotamba) Ambe, Abbe, Avva, Thayi, Devi in Kannada. Amma, Tai in Tamil.
2		This is the rock painting of a corner. Pronounced as Komata or Kopara in Gondi language, it means corner, cloth. Mooli or Vastra in Kannada. Thuni/ Aadai in Tamil.
3		This is the rock painting of a grain stalk. Pronounced as Oma or Nela in Gondi language, it means stalk of grain, farm, field, area. Bhoomi, Nela, Hola, Pradesh, Nellu in Kannada. Nilam, Nelam, Idam, Nel in Tamil.
4		This is the rock painting of a plough. Pronounced as Kuri or Ur in Gondi language, it means plough or place. Kurgi Negilu or Sthala in Kannada. Kalapai or Ur in Tamil.
5		This is the rock painting of a small plough or a hoe. Pronounced as Menda or Goda in Gondi language, it means sheep. Kuri in Kannada. Kuriyadu in Tamil.
6		This is the rock painting of yarn. Pronounced as Nool in Gondi language, it means thread, wool. Kuri Unneya Nool in Kannada. Kambali Nool in Tamil.
7		This is the rock painting representing the distance between two posts. Pronounced as Atum in Gondi, it means market. Sante, Marukatte in Kannada. Sandhai, Kadaiveedhi in Tamil.
8		This is the rock painting of a path. Pronounced as Sarri in Gondi language, it means way, means. Madhyama, Marga, Saalu, Daari in Kannada. Saalai in Tamil.
9		This is the rock painting of a crescent and a bow. Pronounced as Parai Bil in Gondi language, it means rocky roof. Bandeya chavani in Kannada. Parai koorai in Tamil.
10		This is the rock painting for a crack in a wall, it is pronounced as Konada or Koppi in Gondi language, it means Cave or Shelter. Guhe or Kompi in Kannada. Guhai Vasipidam in Tamil.

11		This is the rock painting for a pair of scissors used in fire, it is pronounced as Koya or Koyal in Gondi language, it means Shepherd. Meshapal, Kuruba in Kannada. Koidhal, Kuriyadu Maithal in Tamil.
12		This is the rock painting for a small plough or spade, it is pronounced as Menda or Goda in Gondi language, it means Sheep. Mesha, Kuri in Kannada. Kuriyadu in Tamil
13		This is the rock painting for a curved, pointed blade, it is pronounced as naang in Gondi language, it is used as a suffix in Gondi for genitive case, it means 'of'. Pratyaya in Kannada.
14		This is the rock painting for a star, it is pronounced as sookum in Gondi language, it is the symbol of night, it means Star. Nakshatra Ratri in Kannada. Nakshatra iravu in Tamil.
15		This is the rock painting of a plant at the bottom of a canal or a stream. Pronounced as kalavaya in Gondi language, it means time. Kaluve, Samaya in Kannada. Kaalvai, Vaikkal, Neram in Tamil.
16		This is the rock painting of a pair of scissors used in fire. It is pronounced as koyari in Gondi language, it means Shepherd. Meshapala, Kuruba in Kannada and Kuriyadu Maipavan in Tamil.
17		This is the rock painting of a plough. Pronounced as Kuri or Ur in the Gondi language, it means place. Sthala in Kannada. Kalapai, Idam in Tamil.
18		This is the rock painting of two crescents. Pronounced as parayik in Gondi language, it means morning. Munjau, Nasuku in Kannada. Kaalai in Tamil.
19		This is a curved, asymmetrical rock painting. Pronounced as Kokara Kora in the Gondi language, it means crowing. Koliya Koogu in Kannada. Koli Koovudhal in Tamil.

Summary

1	2	3	4	5
Mother deity	Corner, cloth	Field, area	Temple	Sheep

6	7	8	9	10
Woolen thread	Market	Way	Rocky roof	Cave shelter

11	12	13	14	15
Shepherd	Sheep	suffix	star	time

16	17	18	19
Rest	Place	Morning	Crowing

Conclusion

Dr. Motiravan Kangali explains the meaning of these 19 symbols (pictographs) through the Gondi language as follows:

- The Kotamba cave shrine is on the main road of the woolen market. This rocky roof shelter is for shepherds and sheep to stay at night till morning.
- Of these 19 pictographs, 14 resemble the Indus script and 5 are symbols of shepherds, sheep, and wool. This proves that the word Goda>Gonda> Gond, Koya>Kuruba is derived from the Gondi/ Koya dialect. Koyal means sheepherder or shepherd. In India, the Gond tribe is also known as Koya or Koytur.

References

1. These Indus signs (Nos. 1, 134&145, 162, 179, 186, 129, 150, 194 & 129) resemble the Hampi rock's painting Nos. 1, 2, 3, 4, 7, 11, 14, 15 & 16 respectively. They are mentioned in Sign List of the Indus Script on pages 32-33 in the book The Indus Script Texts, Concordance and Tables by Iravatham Mahadevan (1977) published by the Director General, ASI, India, New Delhi.

2. These 3 Indus signs are mentioned on page Nos. 151, 162 & 163 in the List of Signs under Appendix in the book The Harappan Civilization and its Writing;A Model for the Decipherment of the Indus Script by Walter A. Fairservis (1992), ISBN 81-204-0491-2 (Oxford & IBH) & ISBN 90 04 09066 5 (E.J. Brill), Published in India at Rekha Printers Pvt. Ltd., New Delhi. These 3 signs are similar to the Hampi rock's painting signs nos. 18, 8 & 9 sequentially.

3. These 2 Indus signs are mentioned at 'Appendix A: Sign List with 702 Signs of the ICIT Database' in Dr Andreas Fuls's article entitled "Ancient Writing and Modern Technologies – Structural Analysis of Numerical Indus Inscriptions" are similar to the Hampi rock's painting signs nos. 13 & 17. (https://www.academia.edu/41952485/Ancient_Writing_and_Modern_Technologies_Structural_Analysis_of_Numerical_Indus_Inscriptions 25.12.2024)

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Understanding Indus Riddles in the Absence of a Bilingual Script

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The Indus Valley Civilization (IVC), undoubtedly one of the oldest urban civilizations, flourished in modern-day India and Pakistan during the third millennium BCE. It is known for the well-planned cities, sophisticated drainage systems, and grid pattern streets. A society that valued consistency in weights, measures, and urban planning. A strong standardization protocols are obvious. In addition to engaging in trade, crafts, and agriculture, the people also used a script that has yet to be deciphered on pottery and seals. The civilization was notable for being uniform and consistent throughout its large territory, in contrast to Egypt or Sumerian. The decline of the IVC is believed to be around 1900 BCE, not necessarily due to a reason; causes could be multiple- changing rivers, climate shifts, and environmental factors.

Charles Masson first brought the ruins of the Indus Valley Civilization to the attention of the modern world in 1829, when he wrote about Harappa in his travelogue in 1842. Alexander Burnes later observed that the location used ancient baked bricks. Alexander Cunningham surveyed Harappa after the Archaeological Survey of India (ASI) was established in 1861, and found a seal with an unidentified script, but he thought the location was a Buddhist city.

The real discovery occurred in John Marshall's "golden age" at ASI from 1902 to 1928. Though Daya Ram Sahni excavated Harappa in 1921 and Rakhal Das Banerji excavated Mohenjo-daro in 1922, Marshall was responsible for the overarching direction of the excavations at Harappa and Mohenjodaro. The artifacts and findings from these 700-kilometer distant regions showed remarkable similarities, such as pictographic seals and painted pottery. This discovery made us rethink India's cultural history, leading to Marshall's official announcement of the Indus Valley Civilization in 1924. Later, in the 1930s, further excavations were carried at Harappa under Madho Sarup Vats, while K. N. Dikshit, followed by Ernest Mackay carried out excavations at Mohenjodaro.

1. Introduction

One of the most profound obstacles in deciphering the Indus script is the absence of a bilingual inscription like a "Rosetta Stone" that could provide a comparative linguistic key. It is also important to know whether, such a key found in a politically inconvenient location, would be revealed or hidden.

In this challenging environment, a significant announcement was made at the International Indus Conference, marking a turning point for Indus script research. A one-million-dollar reward was announced by the Honourable Chief Minister of Tamil Nadu for anyone who could decipher the Indus script in a convincing way and acceptable by the stakeholders. Adding to this momentum, Dr. Omar Khan disclosed that another institution has pledged a similar prize, thereby doubling the reward to two million USD. The day when the Indus Script can be deciphered will be a great day. But pending that, what are we going to do?

2. Riddles of the Indus

The Indus Valley Civilization poses many riddles.

- *Who were the authors of the Civilization*
- *What language or languages did they speak?*
- *Where to look for the antecedents of Harappan urbanism?*
- *How do we trace the lingering legacies of IVC in the classical texts of the Indian Sub-continent?*
- *Are there any takeaways for the future?*

3. The Enigma of the Indus Script: A Linguistic and Cultural Puzzle

The Indus script stands as one of the most enduring and puzzling mysteries in the study of ancient civilizations. Despite decades of intensive research, no scholarly consensus has yet emerged regarding the linguistic affiliation or underlying structural principles. As a result, the Indus scripts remained undeciphered. Over time, the script has been tentatively linked to a vast array of linguistic families including the Austro-Asiatic, Dravidian, and Indo-Aryan, reflecting the diversity of theories that attempt to unravel its profound mystery.

Most scholars agree that the Indus Civilization was multilingual. Marshall suggested several Dravidian-related languages, while McAlpin proposed Proto-Elamo-Dravidian. Parpola and Iravatham Mahadevan preferred a Proto-Dravidian script, but admitted pluralism. Witzel and Kuiper highlighted Para-Munda substrates, reflecting a wider linguistic mosaic. Zvelebil and Southworth have argued that Dravidians migrated later from the Iran–Baluchistan routes. Possehl underlined the importance of ethnic and linguistic diversity, including languages that have since become extinct, and Allchin & Kenoyer provided supportive archaeological evidence suggesting cultural and linguistic diversity.

Amidst this intricate web of speculation, it is the Dravidian hypothesis that has maintained the most prominent and enduring position as a leading candidate for the script's linguistic basis.

While some more speculative claims have even drawn parallels between Indus symbols and distant scripts like the Easter Island rongorongo, such ideas are generally considered fanciful and lack substantial empirical grounding.

Among the multitude of theories proposed, the Dravidian hypothesis stands out as the most robust working model for interpreting the Indus script and understanding the linguistic and cultural background of the Harappan people. Asko Parpola and many eminent scholars have agreed, the Dravidian hypothesis as the best hypothesis. Iravatham Mahadevan has stated that the Dravidian hypothesis is the best working hypothesis to decipher the Indus script and understanding of the language and culture. However, not all scholars agree with this view. The scholars such as Steve Farmer, Michael Witzel, and Richard Sproat have argued that the Indus script is not script and rather non-linguistic.

In a powerful disagreement to these claims, Iravatham Mahadevan, issued a strong statement in 2009: *"There is solid archaeological and linguistic evidence to show that the Indus script is a writing system encoding the language of the region (most probably Dravidian). To deny the very existence of the script is not the way towards further progress".*

For instance, one of the most compelling arguments supporting the Dravidian hypothesis is the well-documented presence of Dravidian loan words in the Rig Veda, widely recognized by scholars of Sanskrit and Dravidian, was used by Asko Parpola to indicate the strong possibility of Dravidian languages having been spoken in Indus-Harappan geographies where the Rig Veda was composed in the 2nd millennium BCE; noting also that Brahui in Balochistan is the only surviving Dravidian language in that region.

Adding another layer of profound mystery to the Indus Valley Civilization is the complete absence of any direct mention of it in any ancient Indian historical or religious literature written in the North and North-west region. Neither the Vedas nor the epics—the Mahabharata and the Ramayana, make any explicit reference to the grand cities like Mohenjo-daro or Harappa. In contrast, the ancient Tamil corpus, namely Sangam literature, turns out to be the urban literature par excellence, written within the Indian Subcontinent. The corpus celebrates urban lifestyle, port towns, economic and political centers, town planning, Urban Infrastructure and a sort of multilingualism, peculiar to larger cities. However, these references also cannot be considered as direct reference to the IVC cities because of spatial and temporal gaps. Instead, if we are looking for legacy markers and tell-tale evidence that would represent the continuity of IVC's social and cultural priorities into post-harappan and historical cultures of India, then the corpus to be deeply examined is the sangam literature of the ancient Tamils. In the absence of a convincing decipherment of the Indus script, its riddles still linger.

4. The Current Status of Decipherment

The Indus script's decipherment remains unresolved, and scholars have yet to agree on a common interpretation, even after nearly a hundred years of study. Still, some important research directions have taken shape, especially through the work of renowned scholars like Asko Parpola and Iravatham Mahadevan. Both have made major contributions to the idea that the script may be linked to a Dravidian language.

One particularly fascinating part of their research is the suggestion that the presence of Murugan, a much-loved and ancient deity in Tamil culture, might have been part of the religious or symbolic world of the Indus Valley Civilization. What makes this convergence so striking is that both Parpola and Mahadevan, despite working independently and employing distinct methodologies, arrived at a strikingly similar conclusion, that a divine figure resembling Murugu or Muruku may have been known or venerated in the Harappan civilization.

Parpola's Rebus Approach, employs a sophisticated rebus reading technique, drew fascinating connections between the bangle-like motifs (Sign No. 403) observed on certain Indus seals and the Tamil word "murukku," which refers to a spiral-shaped snack made by twisting dough. The visual resemblance between the twisted spiral of the snack and the circular form of bangles led Parpola to hypothesize that the symbol for a bangle (or spiral) might phonologically represent the name of Murugan (also known as Muruku or Murugu).

Mahadevan's Interpretation of Murugu, in contrast, approached the question through both iconographic and ethnographic interpretations. He interpreted Murugu as demonic and tribal god of ancient Tamil, which he compares with the Harappan skeletal (Seal No. 48) deity.

Parpola used the rebus principle (finding meaning through sound and symbols), while Mahadevan focused more on cultural and symbolic meanings. Though their methods were different, both scholars came to a similar conclusion. They each saw traces of Murugan-like figures in the Indus civilization, and both firmly believed these connections pointed to a Dravidian linguistic background. For many researchers, the fact that two leading experts arrived at such similar insights, through different approaches, was both powerful and thought-provoking. If two such methodical researchers, working through distinct sign systems, independently arrive at the same name—Murugan, within the Dravidian context, it signals something deeply meaningful and warrants serious consideration.

This intellectual convergence marked a personal turning point in my journey with the Indus script. I came to the conclusion that I will not spend my time deciphering the Indus script, realizing that the most brilliant minds, using different techniques, could arrive at a similar result, only to face continued challenge or outright rejection.

5. Will the Indus Script Ever be Deciphered?

The profound question that echoes in the minds of all drawn to the mystery of the Indus Valley Civilization is simple yet profoundly unsettling: Will the Indus script ever be deciphered?

Many hold onto the hope of discovering a bilingual inscription like a Rosetta Stone. However, a hypothetical question arises: even if such a bilingual artifact is found, will it ever be made public? While this might strike some as suspicion, historical precedents unfortunately offer reasons for caution. There have been documented instances of delayed publications of reports, and strategic silences surrounding archaeological findings. The most frequently cited example is the case of the Keeladi excavations in Tamil Nadu. Despite its groundbreaking potential to rewrite the early history of South India, the first excavation report was inexplicably stalled for

years, taking over 19 years to be released. This naturally fuels suspicion: what if the "Rosetta Stone" of the Indus script were to be discovered in a politically inconvenient location? Would it be revealed, or perhaps metaphorically or even literally buried?

Suppose such a bilingual inscription were to be unearthed in Keeladi, or Adichanallur in Tamil Nadu, it would be guarded with the utmost care— "guarded like our eyes and our soul". These places possess the emotional investment, scholarly backing, and public vigilance to ensure that the artifact is studied with integrity and its findings shared transparently with the global community. However, if, by chance, it was to be found in regions where the academic or institutional culture is less transparent or, worse, driven by political motivations, the distinct possibility of it being withheld or misinterpreted cannot be entirely ruled out.

One day, a Rosetta Stone-type bilingual inscription may be discovered. But we are not sure—it may also never be found. Moreover, the location from which such evidence emerges will be equally significant. One does not know whether such evidence is still waiting to be discovered in distant regions once linked to Harappan trade networks. Whatever the case may be, the question arises: should we remain idle and feel utterly helpless? The answer is an Absolute No. This is precisely where the door must be opened to unconventional possibilities. Instead, the key can come from the flourishing fields of data science, artificial intelligence, machine learning, and computational linguistics. A techno-driven, "out-of-the-box" solution could hold the key, a method capable of detecting linguistic patterns, symbol recurrences, syntactic clues, or semantic fields that the human mind may have previously overlooked.

6. Indus Archaeology with reference to "the south" - "has gone south"

There is a heartrending phrase in English "gone South", as defined by the Cambridge Dictionary signifies, when something "goes South", it means it has collapsed, failed, declined, or deteriorated beyond retrieval. Sadly, this seems an apt description when we look at the state of Indus research in relation to South India. Although the Indus Valley Civilization (IVC) continues to attract widespread archaeological interest worldwide, its southernmost extensions, particularly their connections to peninsular India have received far less attention; politically and academically abandoned.

Daimabad for instance, is commonly known as the southernmost site associated with the Indus Civilization. Despite its historical importance, the site does not yield significant importance for research or excavation. Its stagnation is not due to natural causes, but rather the result of long-standing administrative delays and a lack of scholarly engagement.

However, the true lament extends far deeper than Daimabad alone. A historical trail of scholarly warnings and suggestions that could have fundamentally reshaped the map of Indian archaeology has remained tragically unanswered for nearly a century. In 1935, when K. N. Dikshit, then the Director General of the Archaeological Survey of India (ASI) and a respected colleague of Sir John Marshall, visited University of Madras. His lecture on "Prehistoric Civilization of the Indus Valley," that eventually published in 1939 was far from a casual commentary and sounded like a strong request. Dikshit strongly encouraged archaeologists in Tamil Nadu, especially in areas like Korkai and Tirunelveli, to take up excavations, highlighting the possibility of uncovering

cultures that were either contemporary with or linked to the Indus Valley Civilization. This was not a casual suggestion from an outsider; he was the topmost authority in Indian archaeology at that time, drawing from field experience and pointing to the earlier discoveries at Adichanallur made by Alexander Rea in 1904.

From 1935 to 2004, there was no crucial development and represents seven decades of institutional slumber. Even when excavations finally resumed at Adichanallur under T. Sathyamurthy in 2004–05, the results met a familiar, frustrating fate; with the report being not published for over 15 years. These findings, which could have played a major role in reshaping how we understand India's early civilizational past, remained inaccessible to both the public and scholars for years. It was only after the Madras High Court stepped in that the report was finally made public, sometime around 2019. This is not merely an academic delay; it constitutes the denial of a nation's rightful cultural history.

Keeladi has suffered a similar fate. The early phases of the ASI-led excavation by Amarnath Ramakrishnan, have yet to be officially published. Much water has flowed in Vaigai and Keeladi since then, irrespective of whosoever say what.

7. Will the Indus Script Ever be Deciphered? or Should We Read its "Body Language"?

The price announcement for deciphering the Indus Script may encourage techno-savvy scholars and independent researchers to find new ways. This initiative may finally encourage techno-skilled scholars, data scientists, and even AI researchers to step in and offer out-of-the-box solutions. Decipherment may not exclusively emerge from traditional epigraphers; it may indeed come from unexpected quarters, and that is perfectly acceptable.

In the absence of a complete decipherment, a vital alternative approach remains open in studying the "body language" of the Indus civilization. This is precisely the path I have chosen, making a conscious decision not to engage in the competitive race to "crack the script". I may not be a trained linguist, or to possess more knowledge like the esteemed scholars Iravatham Mahadevan or Asko Parpola. However, I possess the ability to read patterns, to decode spatial and cultural continuities, and listen attentively to the archaeological silences.

Understanding the IVC need not completely rely on linguistic decipherment. Instead, we can gain the insights by meticulously observing its urban planning, motifs, drainage systems, craft technologies, burial practices, and iconography. Seeking out the lingering legacies in our classical texts, in our rituals, and in the living memories of the subcontinent's diverse communities. This sound for the development of a multifaceted archaeology that not only studies tangible objects but also to explore the absences.

8. The South Must Reclaim its Place in Indus Discourse

This moment marks the first time since K. N. Dikshit's pivotal 1935 address that we are witnessing a structured, government-sponsored initiative to revitalize Indus-related research in the South of India. This momentum must not be misspent. We must dig; we must publish;

we must protect. The Government of Tamil Nadu, the Indus Research Centre at RMRL, and Tamil scholars have played a vital role in keeping Indus studies alive and active. This is the right time to build on that momentum and take the work to the next level.

The assertion that the South has "gone South" might have held true in the past, but not anymore. The time has decisively come for South India to rise, not merely as a footnote to the Indus Valley Civilization, but also to study on its origins, its expansive reach, and its enduring legacy.

9. Body Language of a Civilization

When we speak of "body language" in the context of undeciphered scripts like the Indus signs or ancient graffiti marks, we really talk about a kind of expression that goes beyond words. These marks don't give us readable texts, but they leave behind something physical in their shapes, occurrences and repetitions, often scratched onto pottery or other objects. There's a quiet necessity in them, a rhythm, a logic—something that suggests intention. Through their patterns and placements, they form a kind of visual grammar. Their language may be silent to us, but they are not empty and it is clear that they meant something.

9.1. Indus Signs and Graffiti Marks of Tamil Nadu and South India

A recent book *Indus Signs and Graffiti Marks of Tamil Nadu,* co-authored by Dr. K. Rajan and Dr. R. Sivanantham, was ceremonially released by the Hon'ble Chief Minister of Tamil Nadu, was a recent contribution to the understanding of Indus signs and Graffiti signs. This innovative study reveals an astonishing fact that about 60% of the graffiti marks found in Tamil Nadu exhibit parallels with Indus signs, and more than 90% of South Indian graffiti resembles those of the Indus Valley Civilization (IVC). Such an extensive overlap cannot be dismissed as a coincidence; it strongly points to a deeper cultural and civilizational continuity. This study proves that deciphering the Indus script can also help decipher graffiti marks found in Tamil Nadu and vice versa.

Scholars have suggested that instead of attempting to decode everything at once, a regional and micro-approach should be adopted, fostering conversations around localized contexts. Simultaneously, there is a need for an "aerial or drone-level view" in a broader civilizational perspective to understand how these signs traversed and transformed across vast geographical spaces and through time.

Prof. Rajan mentions, more than 15,000 graffiti marks have been found in Tamil Nadu alone. And yet, we have no real idea how many more might be lying unnoticed or unstudied across the rest of southern India in places like Andhra Pradesh, Telangana, Karnataka, Odisha or Kerala.

However, till this script or graffiti is deciphered and a language is found, this corpus remains a part of the "body language". The typology of these graffiti marks remains surprising, how the same kind of signs are drawn in graffiti and how they could be written in pottery. I consider that intention and execution as body language, because I don't know the language.

9.2. Why Graffiti on Black-and-Red Ware?

It's quite fascinating that Tolkāppiyam, an ancient Tamil grammatical text, chose to focus specifically on just two colors: black and red. This wasn't because it lacked words for other hues like white or blue, but likely because these two colors held a unique cultural significance in Tamil thought, deeply connecting the "color of a material" with the "character" or essence it represented.

Graffiti tends to show up regularly on black-and-red ware, but it's noticeably missing from painted grey ware (PGW). The PGW is considered as a kind of elite pottery, linked with elite-class or new cultural influences in the Gangetic plains. On the other hand, graffiti shows up commonly on BRW pottery, that might've been made by local potters, traded in markets, or used in homes for daily tasks. It seems graffiti belonged more to the world of the common people than to that of the elites.

Most of the Graffiti potsherds in Tamil Nadu, Odisha, Andhra Pradesh, Telangana, Karnataka, and Kerala are found in the black-and-red ware pottery, a type of pottery that is assumed to show up again and again in Megalithic, Iron age and Early historic contexts across the South. This selective occurrence prompts profound questions: Does the presence of graffiti on BRW but not PGW imply cultural exclusivity in literacy or symbolic communication? The act of marking pots with signs were names, religious symbols, clan marks, or trade notations—a vernacular practice, a grassroots language of the masses, distinct from the elite-coded PGW traditions.

Interestingly, BRW is found not just in South India but extends across the entire subcontinent. A distribution map shows white dots representing BRW across southern India, Gujarat (where mature Harappan settlements thrived), through the Narmada and Tapi valleys, up to the Kaimur Hills, and further east into Jharkhand, Bihar, Odisha, Bengal, and Assam. This widespread suggests a cultural network, possibly earlier than or parallel to the Aryanized PGW-NBPW (Northern Black Polished Ware) zone. In fact, the BRW overlaps PGW and NBPW in a few locations. Adichanallur in Tamil Nadu, a pivotal archaeological site that has yielded both BRW and NBPW, indicating a multi-cultural cohabitation and interaction long before any recognized "Aryan migration".

Fig. 1: Tamizhi - Kuviran Atan engraved in Black-and-red ware (Left) and Painted Grey ware (Right)

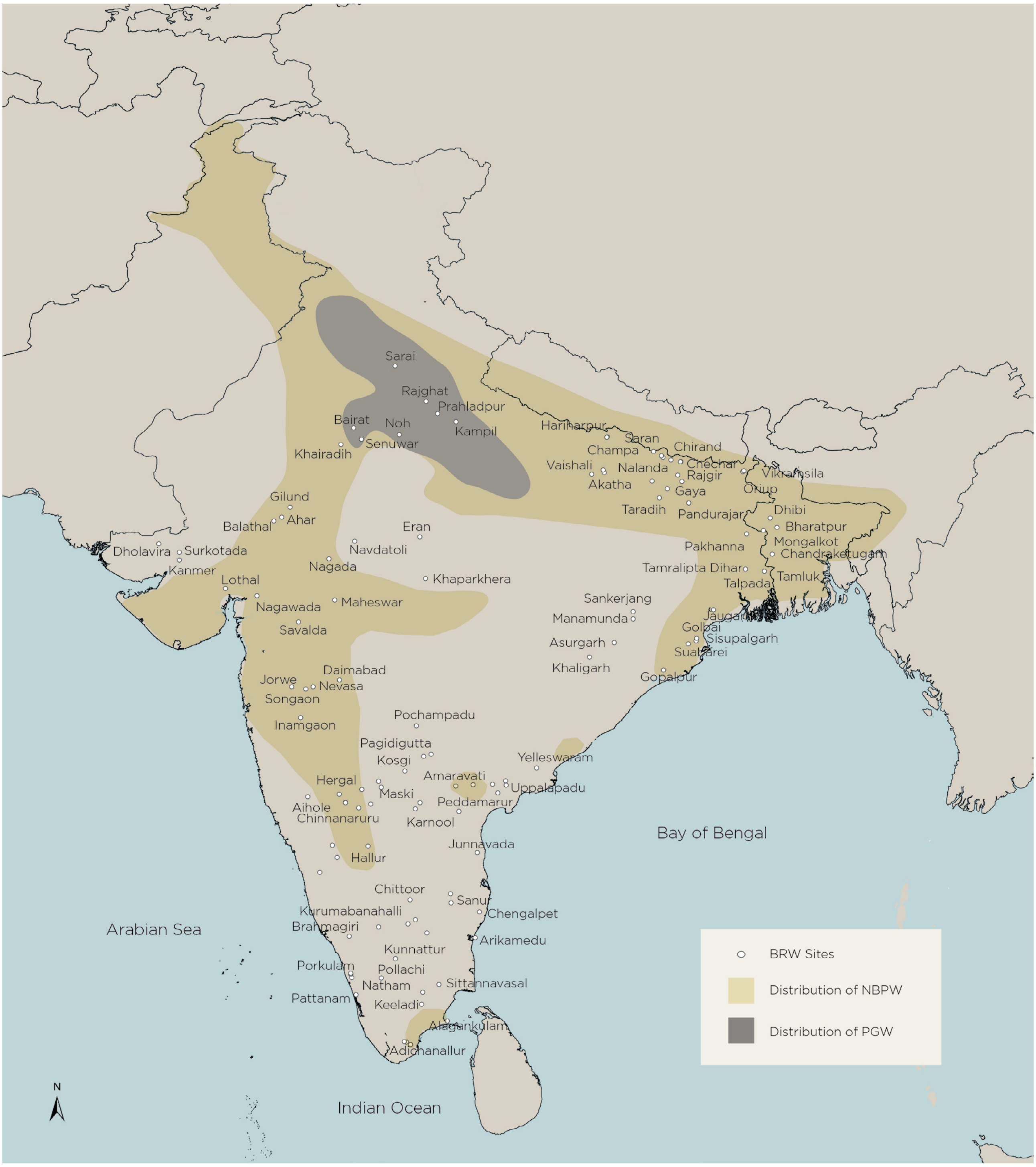

Fig. 2: Spread of BRW, PGW and NBPW potteries in Indian Sub-continent

This map intricates the interplay of BRW, PGW, and NBPW, not merely a distribution chart of ceramics. It represents an aerial map of a cultural landscape, a tableau of interaction, and the silent spread of symbols. It profoundly tells us that the Indus people, or their cultural descendants, reached many corners of the subcontinent, even if they might have inscribed their "literature" only where the context and societal structure allowed them. This is precisely why these graffiti marks are more than just scratches on clay; they are profound cultural imprints. They are the expressed memory of a civilization, one that was common, dynamic, and expressive, even when it was linguistically silent to us.

Until we decipher them, and definitely one day we will, we must serve them for what they truly are: a powerful body language. And so, when someone picks up a pot and etches a symbol onto its surface, they are evidently saying something. Even if we do not know the message, we must listen intently.

9.3. The 'High-West: Low-East' Dichotomy of Indus Cities: A Dravidian Paradigm

The Indus Valley Civilization (IVC), recognized as one of the world's earliest and most civilized urban cultures, has attracted historians, archaeologists, and linguists for generations. Beyond its distinguished urban planning and technological excellence, the IVC expresses several distinctive cultural markers that provide a convincing reinterpretation through a Dravidian lens. The civilization's distinct features such as its use of baked bricks (precise ratio of 1:2:4), the prevalence of Mother Goddess figurines, terracotta toys, and standardized measures, represent

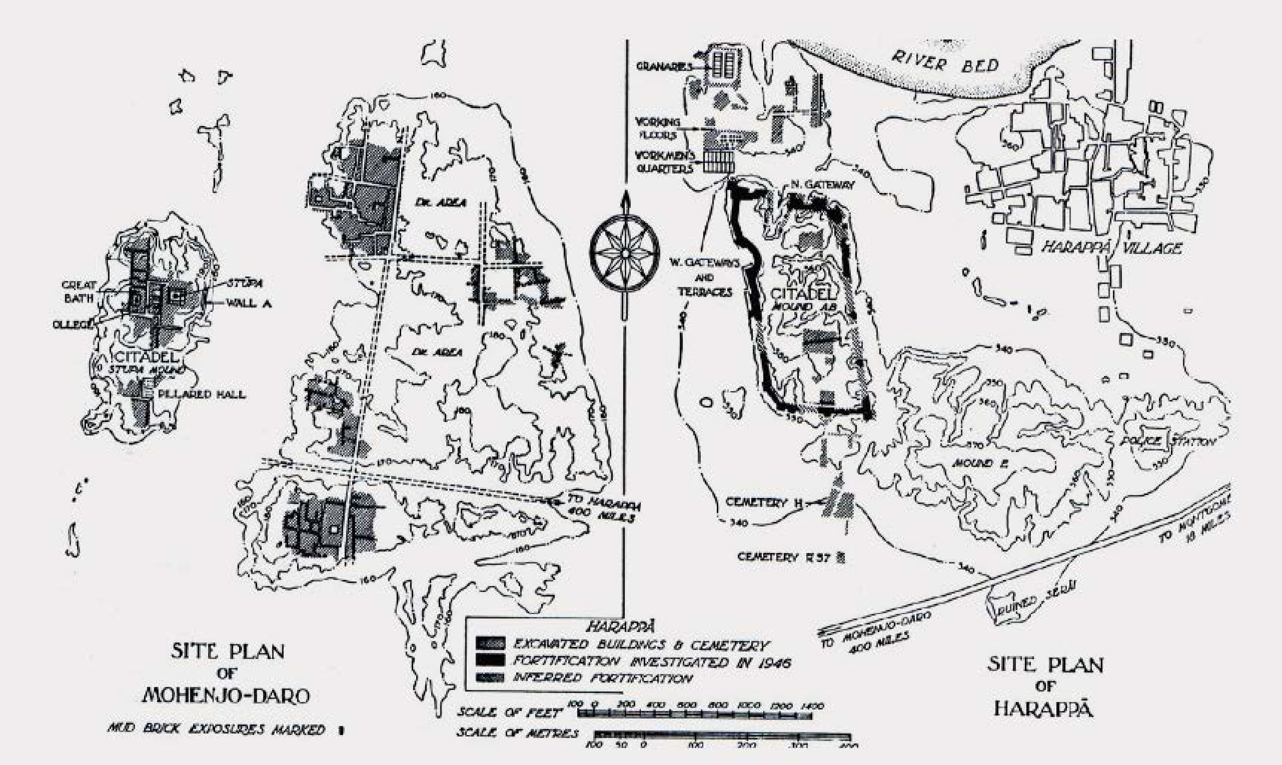

Fig. 3: Site Plan of Mohenjo-daro exhibiting the High-West: Low-East Dichotomy

Fig. 4: Brick-structured well (Left) and Town planning of Mohenjo-daro (Right)

not only their technological excellence but also deeply implant the cultural patterns that echoes across years and vast geographies.

These meticulously crafted bricks formed the foundational elements of grand citadels, intricate drainage systems, vast granaries, monumental baths, and well-organized residential complexes, many of which remain marvels of ancient engineering even today. The most prominent colour found in their artifacts, particularly in pottery, is red—a hue often termed the Dravidian red, signifying not merely its visual identity but its striking continuity in cultural artifacts discovered across southern India.

One of the most defining features of Indus Valley Civilization cities was their consistent Town planning and Layout: a western, elevated Citadel and an eastern, lower town. The widespread uniformity in their urban planning, from organized streets and massive platforms to fortifications and advanced civic amenities, clearly demonstrates this dichotomy was a deliberate and fundamental design principle, not a coincidence. This served as the central tenet of a hypothesis proposed by the author in 2012, which subsequently gained recognition on Harappa.com through Dr. Omar Khan. This concept further served as the conceptual foundation for my book "சிந்துவெளிப் பண்பாட்டின் திராவிட அடித்தளம்", published in 2016. Notably, the eminent scholar Iravatham Mahadevan, in his final published paper, openly and respectfully appreciated and mentioned to draw the inspiration from this book, further validating its significant contribution to IVC discourse.

9.4. Korkai-Vanji-Tondi Complex (KVT Complex)

The complex refers to a striking collection of ancient place-names found in the northwestern regions of the Indus subcontinent that bear an uncanny resemblance to crucial town names—Korkai, Vanji, and Tondi, repeatedly mentioned in ancient Tamil Sangam literature.

This is not merely a linguistic coincidence. These identical name clusters, spanning from the Indus geographies (parts of modern India and Pakistan) all the way to Tamil Nadu in the Deep South, serve as powerful indicators. They strongly suggest a probable migration of the ancestors

Fig. 5: Korkai-Vanji-Tondi complex

of the Sangam Tamils southward, following the decline of the Indus Valley Civilization. While acknowledging that other cultures existed in the South beforehand, this complex specifically traces a significant stream of people on this long historical journey. Asko Parpola suggested, the mention of 'Meluhha' in Sumerian texts is vital linguistic evidence for the Indus, then the survival of these ancient Tamil names in the Indus region must be seen as a "birth-marker" for both the Indus Civilization and the Sangam texts themselves.

The KVT Complex acts as a crucial bridge, connecting the Indus Valley Civilization with the Deep South, challenging archaeologists and historians to fill the vast gaps of time and distance. While the shared names powerfully suggest a link, dating this migration remains a complex task. However, a close reading of Sangam texts reveals these names often allude to even earlier timelines, passed down through generations of bards and collective memory.

The complete absence of these specific place-names (like Korkai, Vanji, and Tondi) in Sanskrit texts makes the KVT Complex even more convincing. These names belonged to ancient Tamil history and identity, and were not Indo-European, but classical Tamil—a language that was unknown to Indo-Aryan speakers. This lack of reference in Vedic and later Sanskrit works further emphasise their unique heritage within Tamil culture.

For anyone involved in Tamil literary tradition, finding these names in various IVC sites provides strong proof of an ancient Dravidian presence in those northwestern regions. These are not random occurrences, instead they function as "surface markers" that could guide future archaeological explorations and help to solve mysteries in the IVC.

10. The Lingering Legacy

Fascinating theory connecting the ancient Indus Valley Civilization to a long-standing cultural practice in South-India

10.1. Gamecocks of the Indus Cities - Cockfight Tradition

At Mohenjo-daro, an intriguing seal (Marshall Seal No. 338) depicts 'two cocks' side-by-side, along with a sign that scholar Iravatham Mahadevan interprets as 'city.' He reads the sequence as "Cocks-City." Mahadevan connects this to the ancient place-name 'Kukkuṭārma' (literally 'the ruined city of cock') and suggests the seal might record the city's original Dravidian name. However, the presence of two cocks, rather than just one, on such a precious seal with limited space, is significant. A closer look at their posture with raised necks, stiff tails, and unsettled legs, strongly suggests these aren't ordinary birds, but gamecocks in a fighting stance.

The concept of a cockfight itself could metaphorically represent an 'east-west' division within Indus cities. Remarkably, this tradition shows continuous evidence in Old Tamil texts and epigraphic records, and it remains a prominent cultural practice today in specific areas of the Indian subcontinent. In Sindh (Pakistan), the very region where the Indus Civilization once flourished, organized cockfights are still popular. In India, Tamil Nadu, Karnataka's Kodagu region, Telangana, and coastal Andhra Pradesh are known for this sport. The recent, nationally awarded Tamil film Adukaḷam was centered on the cockfighting theme, which highlights its deep socio-cultural connection, particularly in Tamil Nadu.

Interesting evidence to the Indus 'Cock's City' seal was found in Kōḻiyūr (also known as Uṟaiyūr), the capital of the early Cholas in Tamil Nadu. Traditional accounts say this city was named after a legendary cock that fought an elephant, an event celebrated on Chola coins depicting a cock fighting an elephant.

10.2. Ancient Tamil Evidence: Literary and Epigraphic Continuities

Ancient Tamil texts Akananuru provide direct and indirect references to organized cockfights. Descriptions of fighting cocks with red feathers and sharp beaks appear in Sangam literature (e.g., Ak. 277). There is even a mention of a Kōḻi Nūl, a treatise on cockfighting. Commentaries on Tamil grammar works like Tolkāppiyam and Naṉṉūl refer to cockfights between 'west' (Mēlaccēri) and 'east' (Kīḻaccēri) quarters of villages. Mahadevan observes that villages often

Fig. 6: Two cocks in a seal (Marshall Seal No. 338), interpreted by scholar Iravatham Mahadevan as 'city'

Fig. 7: Chola Coin (1st cent. BCE) portraying "The City of the Cock", (Mahadevan 2011: 86)

had fighting cocks representing their western and eastern hamlets. Crucially, the continuity of this tradition, linked to these dichotomous quarters, is uniquely found in Dravidian-speaking regions of India.

Further physical proof comes from hero-stones in Tamil Nadu. Dating back to the 5th century CE, these stones were erected to commemorate fighting cocks. At Arasalapuram, a hero-stone for a cock from the western quarter (Mēṟcēri) of a village is found, complete with the cock's image and the toponym. Another at Indalur commemorates a cock from the eastern quarter (Kīḻaccēri). Such hero-stones honouring gamecocks are exceptionally rare outside Tamil geography, solidifying the ancient link between cockfighting and the concept of 'east-west' divided settlements.

10.3. Toponymic Markers: *Mēlacceri* and *Kīḻaccēri*

Place-names, as scholar Arseny Saparov noted, can outlast civilizations. The 'High-West: Low-East' criteria are particularly met by the place-names Mēlacceri and Kīḻaccēri, which are among the earliest attested 'Mēl: Kīl' dichotomous names in 5th-6th century AD Tamil inscriptions, appearing specifically in the context of cockfighting.

Fig. 8: Fighting cock of Mērcēri (Left), Kīḻccēri (Middle) inscription (Mahadevan 2003: 530)

The trail of "Mēlacceri" extends beyond Tamil Nadu: it exists as an ethnonym in Lakshadweep (referring to descendants of immigrants from Malabar) and even as a place-name (Mekeri) in Karnataka's Kodagu region, also known for cockfights. Intriguingly, similar "Mela" or "Melaceri" place-names appear in northwestern geographies like Pakistan and Iran. This suggests that Mēlacceri and Kīḻaccēri could be a crucial link, tracing the origin of cockfighting as a symbol of Indus dichotomy and, by extension, providing clues to the linguistic and cultural affiliations of the Indus cities' architects and their cheering citizens.

In essence, the very layout of Indus cities, with their dichotomous structures, might encode a deep-rooted Dravidian concept. Perhaps in the open spaces between these segregated neighbourhoods, gamecocks representing the 'High-West' and 'Low-East' quarters engaged in fierce battles, fights that were both real and symbolic, capturing the collective spirit of Indus urban life.

10.4. Mother Goddesses

The abundance of terracotta figurines depicting a Mother Goddess in the archaeological record strongly suggests a symbolic reverence for fertility and female creative power. These figurines are often considered part of a broader, possibly pre-Vedic, tradition of goddess worship—a tradition whose echoes persist even today in various parts of South Asia.

It is clear that a prominent deity and a specific worship custom existed in the Indus Valley Civilization. Numerous terracotta female figurines, often interpreted as Mother Goddesses, point to a strong belief in fertility and protection, particularly concerning childbirth. Some even show a mother holding an infant, reinforcing themes of procreation.

Indeed, the Mother Goddess is widely believed to have been the principal deity of the Indus people. A notable long seal from Harappa depicts the Mother Goddess alongside a man with a dagger and women with raised hands. The sheer number of Mother Goddess figures found on various items like pottery, seals, and amulets leaves little doubt that the cult of the Divine Mother was widespread among them. Even today, Mother Goddess figurines are found across the entire subcontinent, a powerful legacy tracing directly back to the Indus Valley Civilization.

Fig. 9: Mother goddess found at Mohenjo-daro (Left) and Adichanallur (Right)

The NIOT published a paper of their findings and concluded that along with Krishnapuram (about 15 km from Tirunelveli), Adichanallur was a prehistoric open cast industrial mining site that produced copper, gold and iron. A Mother goddess object made of copper alloy was found at Adichanallur which was an added testament of the connection between the Indus and Dravidian paradigm.

11. Language Without Words

While the IVC script remains undeciphered, it consistently reveals patterns and internal consistency, especially on its seals. However, beyond formal writing, the civilization communicated through other profound symbolic forms—a distinct kind of body language expressed through objects, games, and gestures.

11.1. Dice on Roll: Pastime of the Past

In 1937, T.N. Ray, in his book "*The Indoor and Outdoor Games in Ancient India*", made a remarkable observation: the earliest known form of the dice game; complete with cubic dice and gaming boards, originated in the IVC. He identified its striking parallels in Tamil, where dice were referred to as *Tandri Kottai*, while Sanskrit used *Bitika*. The discovery of cubic dice at

major Harappan sites like Harappa, Mohenjo-Daro, and Lothal, and more recently at Keeladi in Tamil Nadu, undoubtedly confirms this ancient practice.

The Sangam Age poem from Kalittokai (136) provides a unique glimpse into the world of dice games. The verses provide insights into the dice game with the joy of rolling a perfect ten, the satisfaction of getting a desired small number, and the thrill of rolling again to clinch a win. The fact that these detailed observations about dicing appear within a love poem, highlights how significant the dice game was in the daily lives of ordinary people in ancient times.

Fig.10: Dice found at IVC (Left) and Keeladi (Right)

The Medieval scholars were often perplexed by this reference because many contemporary dice games did not yield a ten. Yet, the archaeological discovery of cubic dice in Indus sites and crucially, now in Tamil Nadu, proves that this was not a mere metaphor, but a deeply embedded cultural memory. This is precisely what the term "body language"—the living traces of culture transmitted not through written script, but through shared human experience.

11.2. Out of Place, Out of Time: The Fauna of Old Tamil

Harappans weren't just focused on internal trade, they also managed to reach far northwest, even to Shortugai for precious lapis lazuli, and set up trading posts all the way in Mesopotamia. With their excellent maritime skills, evident in ports like Lothal, it's easy to imagine them exploring India's southern coasts for pearls, teak, and other goods. This kind of widespread activity naturally meant lots of interaction between the cultures.

A concurrent view of Gilgamesh seal and Indus seal number M-308 provides an interesting reading, leaving no doubt that it can be taken as evidence of idea exchange between the two civilizations. On the Sumerian side, the motif shows two lions, whereas in the Indus context it depicts tigers, since no evidence of lions has been found on Harappan seals. It appears that the Harappans were influenced by the 'Gilgamesh–lion' motif and cleverly adapted it into their own 'hero–tiger' motif, more suitable to their local environment. This scene finds its powerful cultural echo in a hero stone near Karur (Tamil Nadu), where a man fights two tigers on either side, providing a clear case of continuity in culture as "body language" across millennia. And it is obvious that India is the 'land of tigers' in terms of numbers, spread, and rootedness.

Sangam literature holds a fascinating secret with its remarkably accurate descriptions of animals, some of which simply don't belong in ancient Tamil Nadu. This strong connection, particularly with references to fauna found in coastal deserts, points directly to Gujarat as a place that deeply resonates with these vivid poetic memories.

Fig. 11: Hero fighting with two tigers (Left) (Seal M:308, Parpola 1987)
and Hero-stone at Manjanaickenpatti, Karur (Right)

11.2.1. Camels

Tolkāppiyam, mentions about the camel calves ('Kaṉṟu') and adult camels. Such precise linguistic detail strongly suggests the camel was once deeply relevant to an earlier 'Old Tamil ecology' that extended beyond the peninsula.

The *Ciṟupāṇāṟṟuppaṭai* compares driftwood on a seashore to "tall, sleeping camels." This kind of metaphor could only arise from direct experience, strongly indicating an ancient memory carried forward through oral traditions. Given the Indian subcontinent's geography, the Gujarat coast is the sole possible location to have coastal desert with camels to have inspired comparison.

The most compelling evidence comes from Akam 245, which describes a camel used as a beast of burden by the traders, starved and hungry, eating bones out of desperation. This accurate

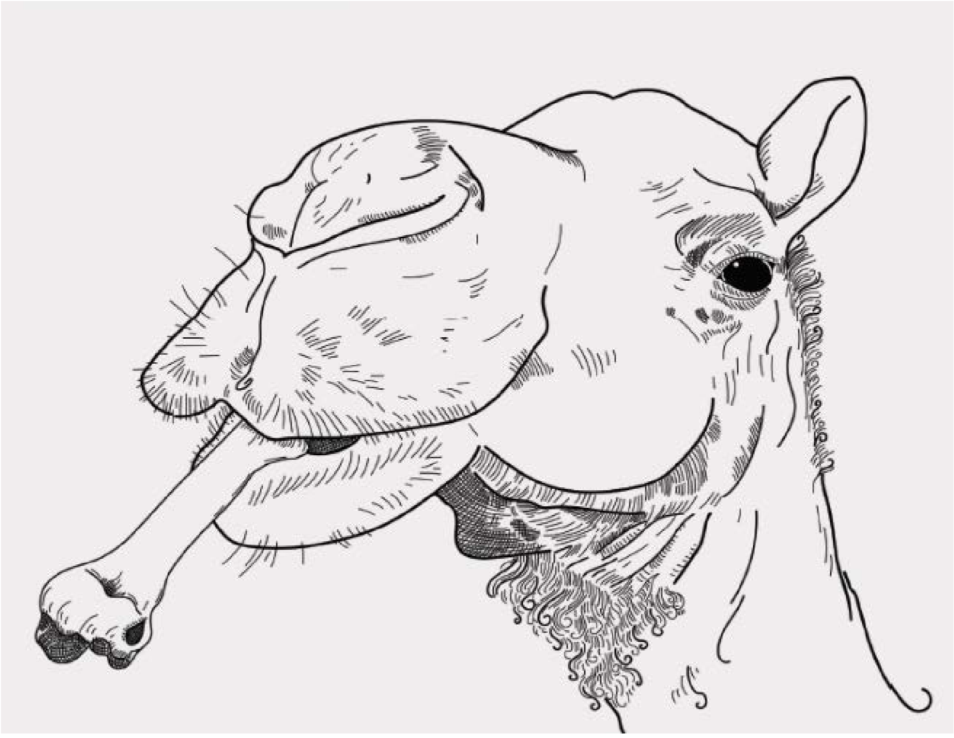

Fig. 12: A bone eating camel as mentioned in Sangam literature (Akam 245)

portrayal of a "bone-eating camel" is no casual observation; only someone intimately familiar with camels would know that they are used to bone-eating after prolonged starvation in the wild. As camels were not common draught animals in peninsular India and such deserts were outside known Sangam-era boundaries, this specific, accurate detail could only have reached these texts through a very long-distance memory and traditions of oral poetry.

For years, this seemingly fantastical line puzzled scholars, until a news article from Pakistan remarkably confirmed that during severe droughts in the Sindh region, camels have indeed been observed eating bones. This astonishing correlation validates the poet's keen eye, not mere imagination, but a precise geographical memory carried across generations.

11.2.2. Wild Asses and Shark Pups

The Sangam verse in *Akananuru* 120, encounters a striking unusual scene of the hero's wild ass being bitten by a shark pup in the backwaters, bravely pulls his chariot as he rushes to meet his beloved. This imagery, where a shark and a wild ass appear together, seems improbable, yet it finds a unique geographical fit in India: the Gujarat coast, particularly the Rann of Kutch. This region is known for both wild asses and being a breeding ground for a rare type of whale shark.

The very precision of this ecological alignment reinforces the compelling idea that Dravidian speakers inhabited Gujarat in a distant past, leaving behind memories narrated into their poetry. This is no mere coincidence; it represents geo-cultural accuracy meticulously preserved in verse—another compelling example of "body language".

Fig. 13: Wild Ass from Rann of Kutch

11.2.3. Grass Eating Yak

The Sangam poem, (Puṟanāṉūṟu 132 and Patiṟṟuppattu 11) mentions about a creature called 'kavari' resting under a *takaram* tree, having grazed on aromatic 'narantai' grass in the high Himalayas and producing aromatic milk. While 'kavari' is often translated as deer, this author argues against it, emphasizing that both the animal and the specific grass are distinctly associated with the Himalayan region.

At present in Ladakh, the yak milk, when used for tea, remarkably becomes the "Yak Aromatic Tea". This intimate ecological and sensory knowledge, deeply embedded in ancient Tamil poetry, is not fiction; it is inherited memory, another powerful form of body language that transcends mere words and scripts.

Fig. 14: Grass Eating Yak from Ladakh

11.2.4. Zebu bull

The Zebu bull (Bos Indicus) is a strong, recurring icon on Indus seals. Notably, cows are absent, despite the biological impossibility of a bull existing without a cow. This selective symbolism raises intriguing questions.

Fig. 15: Zebu Bull on Indus Seal (Seal M:1103, Parpola 1991)

11.2.5. Buffalo

Animal representation within the IVC also provides significant cultural cues. The buffalo, notably not the horse, was a recurring and prominent figure. Cattle-drawn solid-wheeled carts were commonplace, and there is even compelling evidence that buffaloes were exported to Mesopotamia, indicating both their role in trade and their symbolic importance. The very absence of the horse, a key animal figure in Vedic narratives, is itself a compelling point in the ongoing debate concerning cultural succession and interaction within the subcontinent.

11.2.6. The Culture of Bull Sport in Sangam Texts

An Indus seal portrays a buffalo throwing men around in a game-like setting, an image similar to the Tamil practice of bull-taming (like Jallikattu).

The custom of capture of the bull at large as a proof of bravery of the man seeking the hand of a women in marriage is attested in Sangam texts and in *Cilappatikāram*. *Kalittokai* 101 gives graphic details of the preparation, conduct, and the might of the bulls, the valour

Fig. 16: Seal depicting a bull throwing players in a bull vaulting game (Parpola 1987)

of the sportsmen, the participation of young girls with their families as spectators and their emotions. It describes young men confronting bulls that charge with "murderous rage". This is not mere coincidence; it is memory through performance, a cultural script expressed through lived traditions rather than written language.

Fig. 17: Cheras, Cholas, Pandyas symbols in Seal (Seal M:308, Parpola 1987)

Cheras, Cholas, Pandyas symbols in Seal and Sangam One of the most profoundly revealing Indus seals displays a fish, a tiger, and a bow and arrow—all within a single frame. These are not just animals or tools, they are distinct dynastic symbols: the Fish for the Pandya dynasty, the Tiger for the Cholas, and the Bow and arrow for the Chera dynasty. Nowhere outside the Indus world do these three specific symbols converge so prominently. Yet, in Tamil tradition, these symbols are core identity markers of ancient polity. Thus, I convincingly posit them as part of the body language of the Indus culture, meticulously retained within the collective memory of the Tamil people.

Conclusion

A culture without translation, yet fully expressive

The Indus Valley Civilization, despite immense scholarly efforts, has not yet yielded its linguistic riddles. The script remains undeciphered, and the famous "Rosetta Stone" may never materialize; or, if found, might never be "fully disclosed to the public" if found inconvenient to a specific narrative sought to be made. However, this linguistic silence does not make us voiceless in our interpretations.

From the carefully planned brick cities they built to the buffaloes they clearly held in high regard, from ancient dice games echoed in poetry to the deep geographical connections rooted in Sangam literature, and its lasting material expressions, the IVC continues to sound its truths. These truths, though not yet "translated" into a deciphered language, but are deeply understood through shared human experience and the deep cultural traditions through its artifacts, the surprising similarities in Sangam texts in the form of body language.

It is really something how Indigenous families keep their history alive, especially when they hold onto old village names, emphasizing how naming, memory, and ancestry are deeply rooted in Indigenous systems. Names are not random labels but "living links" to a cultural awareness that transcends geography and time. This concept of enduring cultural memory, whether through place names or symbolic representations, is pivotal to understand the Indus progression.

Therefore, we must not solely view with our eyes, fixed on seals and signs, but with our inner vision integrated to the body language of a civilization that, its deep continuing cultural presence might not be silent after all. These material culture, ancient texts, and living traditions provides a rich tapestry in understanding the civilization that communicated its essence far beyond its undeciphered linguistic script.

Even if the Indus script remains undeciphered, it can undoubtedly be "read through" its "body language". History is never a static artifact but a "flowing river". It demands responsible handling, especially amidst ideological pressures and pseudoscientific claims. Rejecting the "melting pot" and "salad bowl" metaphors for pluralism in the Indian context I consciously propose "rainforest" as the appropriate metaphor.

In spirit, in practice, the Indus Civilization was an inclusive 'Rainforest': a "rich, organic, interdependent system" where all species, visible or not, contribute inextricably to the thriving ecosystem. Of all the classic texts of the Indian subcontinent the ancient Tamil literary corpus represents that "carried forward legacy" in related terms more visibly as its core articulation. Today's India also represents that cultural plurality. India, indeed is a 'rainforest'.

I would like to quote a line from the timeless verse of Sangam poet Kanniyan Pungundranar *(Puṟ. 192)*. It says:

"யாதும் ஊரே யாவரும் கேளிர்" (*yātum ūrē yāvarum kēḷīr*)

"Every town is our hometown; every man is our kin". This profound thought, an inclusive ideology captures one of the most important values of Indian civilization. It is evident and gracefully carried forward in Sangam literature that still exhibits in the tribal, Tamil, and pan-Indian consciousness today. This overview highlights the importance of Indus Valley Civilization as a crucial part of India's rich and varied history.

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சிந்துவெளிப் பண்பாட்டின் திராவிட விழுமியங்களும் அதன் தொடர்ச்சியும்

Dr. கி. அமர்நாத் ராமகிருஷ்ணா
இயக்குநர் (தொல்லியல்), இந்தியத் தொல்லியல் ஆய்வுத் துறை, புதுடெல்லி

பொதுவாக வரலாறு என்ற சொல்லை இந்தியத் துணைக்கண்டத்து மக்கள் அனைவரும் அறிந்திருந்தாலும் அது முழுமையான வரலாற்றைக் குறிக்கின்றதா என்று அறியப்படாமலே இருந்து வருகிறது. அதற்கு எடுத்துக்காட்டாகச் சொல்லவேண்டுமென்றால், "கல் தோன்றி மண் தோன்றா காலத்தே வாளோடு முன்தோன்றிய மூத்தகுடி" என்கிற பழமொழி பொதுவழக்கில் இருக்கின்றதேயன்றி, அது வரலாற்றை முழுமையான தரவுகளுடன் அறிந்துகொள்ளும் ஒரு செயலாக இருந்திருக்கவில்லை. அதேபோல் வரலாற்றை எவ்வாறு கட்டமைக்கவேண்டும் என்கிற வரைமுறையைப் பண்டைய இந்திய மக்கள் சரிவர அறிந்திருக்கவில்லை. ஏனென்றால் வரலாறு என்பது மன்னர்களின் வெற்றி மற்றும் வீழ்ச்சியைப் பற்றிய செய்திகளின் பல வடிவங்களாகத்தான் கிடைக்கின்றன.

குறிப்பாகச் சொல்ல வேண்டுமென்றால், கல்வெட்டுச் செய்திகளின் மூலமாகவும், நாணயங்கள், இலக்கியம் மற்றும் சில செவிவழிச் செய்திகளின் மூலமாகவும் வரலாற்றை உணரமுடிகிறது. ஆனால் பெரும்பாலான கல்வெட்டுச் செய்திகள் கொடைகளைப் பற்றித்தான் அதிகம் பேசுகின்றன. அதேபோல் நாணயவியல் மூலம் கிடைக்கின்ற வரலாற்றுச் செய்திகள் சொற்பமே. அந்த நாணயங்களில் பெரும்பாலும் மன்னரின் பெயர், அரசு சின்னங்கள் மற்றும் விலங்குகளின் பொறிப்புகள் மட்டுமே அதிகம் காணப்படுகின்றன. ஆனால் மக்களின் சமூக, பண்பாட்டு அரசியல் மற்றும் பொருளாதார நிலைகள் என்னவென்று கூறும் ஒரு முழு வரலாற்றை விளக்குகின்ற வரலாற்றுத் தரவுகளாக நமக்குக் கிடைப்பதில்லை.

வரலாறு என்பது ஆட்சியாளர்களின் சாதனைகளோடு நின்று விடுவதில்லை. அது சாதாரண மக்களின் உண்மை நிலையை எடுத்துக் கூறுகின்ற வரலாறாக இல்லை. பொதுவாக, இந்தியாவில் இன்று வரை புராணங்கள் மற்றும் இதிகாசங்களை அடிப்படையாகக் கொண்டுதான் வரலாறு கட்டமைக்கப்பட்டு வருகிறது. கற்பனைகளே அதில் அதிகம் காணப்படுகின்றன. அவை உண்மையான வரலாறு அன்று. ஆனால் வரலாறு என்பது அறிவியல்பூர்வமான ஆய்வுகளின்

மூலம் கிடைக்கின்ற சான்றுகளை அடிப்படையாகக் கொண்டு உருவாக்கப்பட வேண்டும். அவ்வாறு உருவாக்கப்படும் வரலாறு முழு உண்மையான தரவுகளின் அடிப்படையிலேயே அமைய வேண்டும். அத்தகைய அறிவியல்ரீதியான ஆய்விற்குச் சமீபகாலத்தில் தொல்லியல் மூலம் கிடைக்கும் தொல்பொருட்களே மிக முக்கியமான ஆதாரங்களாக விளங்குகின்றன. அந்தத் தொல் எச்சங்களை வைத்து எழுதப்படுகின்ற வரலாறே உலக அளவில் அனைவராலும் ஏற்றுக் கொள்ளப்படுகிறது.

முதன் முதலில் இந்தியாவில் எழுதப்பட்ட வரலாற்று நூல் என்று சொன்னால் அது கல்ஹானர் என்பவரால் எழுதப்பட்ட 'ராஜ'தரங்கிணி ஆகும். அது காஷ்மீரத்தின் வரலாற்றைக் கூறுகின்ற நூலாகத்தான் இருந்தது என்ற கருத்து உள்ளது. ஆனால் அது ஒரு முழுமையான வரலாற்றைக் கூறுகின்ற நூல் கிடையாது.

அது சில வரலாற்றுச் செய்திகளை உள்ளடக்கியிருக்கிறது. அதையடுத்து மற்றொரு முக்கிய நூலாகக் கருதப்படுவது பாணபட்டரால் கி.பி.606ல் எழுதப்பட்ட 'ஹர்ஷ சரிதம்' ஆகும். இந்த நூல் மன்னர் ஹர்ஷரின் வாழ்க்கை வரலாற்றை விளக்கும் நூலாகக் கருதப்படுகிறது, மேலும் இந்திய மன்னர் ஒருவரின் வாழ்க்கை வரலாற்றைப் பற்றி முதன் முதலில் எழுதப்பட்ட நூலாகும். அதன்பின் பல்வேறு வரலாற்று நூல்கள் வடிவமைக்கப்பட்டன. குறிப்பாகச் சொல்ல வேண்டுமென்றால் மத்திய காலத்தில் ஆட்சியில் இருந்த சுல்தானிய மற்றும் முகலாய மன்னர்கள் தங்கள் வாழ்க்கை வரலாற்றைச் சுயசரிதைகளாக எழுதிக்கொண்டனர்.

ஆனால் இவ்வகையான நூல்கள் அனைத்தும் முழுமையான இந்திய வரலாற்று நூல்களாகக் கருதப்படுவதில்லை. ஆனால் வரலாற்றுச் செய்தி நூல்களாகக் கருதப்படுகின்றன. அதேபோல இந்திய வரலாற்றைப் பற்றி பல்வேறு அறிஞர்கள் பல வகையான கோணங்களில் எழுதியுள்ளார்கள். இருந்தாலும் இந்திய வரலாற்றை வரைமுறைப்படுத்தி அதை முறையாக எழுதவேண்டும் என்று நமக்குக் கற்றுகொடுத்தவர்கள் ஆங்கிலேயர்கள் என்று சொன்னால் அது மிகையாகாது.

இந்தியாவிற்கு வந்து ஆங்கிலேயர்கள் ஆட்சி அதிகாரத்தில் அமர்ந்தபோது அவர்களுக்குக் கிடைத்த ஆதாரங்களின் அடிப்படையில் அவை அமைந்திருந்தன. குறிப்பாகச் சொல்ல வேண்டுமென்றால் அப்பொழுது அவர்களுக்கு வடமொழி இலக்கியங்களே மிகப்பெரிய வரலாற்று ஆதாரங்களாக இருந்தன. சமஸ்கிருத இலக்கியங்களை வரலாறு என்று கருதி இந்திய நாட்டின் வரலாறு வேதகாலத்தில் இருந்து தொடங்குவதாக வரலாற்றை அவர்கள் உருவாக்கினார். அதாவது 1784 ஆம் ஆண்டில் தோற்றுவிக்கப்பட்ட ஆசியாட்டிக் சொசைட்டி ஆப் பெங்கால் (Asiatic Society of Bengal) என்ற கீழ்திசை ஆய்வுகள் நிறுவனத்தின் தலைவராக இருந்த சர். வில்லியம் ஜோன்ஸ் கல்கத்தா உச்சநீதிமன்றத்தில் நீதிபதியாக பணிபுரிந்ததோடல்லாமல் வரலாற்று ஆய்வாளராகவும் இருந்தார். இவர் 'ஹிந்து சட்ட நிறுவனங்கள்' (Institute of Hindu Law) என்கிற வரலாற்று நூலை எழுதினார், இவருடைய காலத்தில் சமஸ்கிருத இலக்கியங்களிலிருந்து கிடைக்கும் தரவுகளை வைத்து இந்திய வரலாற்றினை எழுதுகின்ற முறை துவங்கியது. அடுத்து வந்த சர். ஜான் மார்ஷல் சிந்து சமவெளி அகழாய்வுச் செய்யவில்லையென்றால் இந்திய வரலாறு என்பது வேதகால நாகரிகத்திலிருந்துதான் தொடங்கியது என்கிற கருத்து மட்டும்தான் தற்போது வரை நமக்கு இருந்திருக்கும். ஆனால் ஜான் மார்ஷல் சிந்து சமவெளி, ஹரப்பா, மொகஞ்சதாரோ ஆகிய தொல்லியல் இடங்களில் அகழாய்வு செய்து, அங்கு கிடைத்த தொல்பொருட்களை

வைத்து இங்கு வேத காலத்துக்கு முற்பட்ட ஒரு நாகரிகம் இருந்துள்ளது என்ற கருத்தை உறுதிபட விளக்கி அறிக்கை வெளியிட்டார்.

செப்டம்பர் 20, 1924 அன்று வெளியான லண்டன் இல்லஸ்ரேட் நியூஸ் (London Illustrated News) என்கிற பத்திரிகையில் வேதகாலத்திற்கு முற்பட்ட ஒரு நகர நாகரிகம் இந்தியத் துணைக்கண்டப் பகுதியில் இருந்தது என்று அறுதியிட்டு கூறினார்.

உலக நாடுகளில் பல தொல்லியல் முக்கியத்துவம் வாய்ந்த இடங்கள் அமைந்துள்ளன. ஆனால் அவையெல்லாம் ஒரு சிறிய நிலப்பரப்பை மட்டுமே கொண்டுள்ளன. உதாரணமாக, மஞ்சள் ஆற்று (Huang He) சீன நாகரிகம், யூப்ரடிஸ், டைகிரீஸ் ஆற்றங்கரையில் அமைந்துள்ள மெசபடோமியா (Mesopotamia) மற்றும் சுமேரியா நாகரிகம் (Sumerian), நைல் நதியில் அமைந்துள்ள எகிப்திய நாகரிகம் (Egyptian) அவைகள் யாவும் ஒரு சிறிய பரப்பளவில் மட்டுமே கொண்டுள்ளன என்பது ஆய்வுகளின் மூலம் தெரிய வருகின்ற செய்தியாகும். ஆனால் சிந்து சமவெளி நாகரிகம் அவ்வாறல்ல. அது கிட்டத்தட்ட 13 லட்சம் சதுர கிலோமீட்டர் பரப்பளவில் பரந்து விரிந்து அமைந்துள்ளது.

1947ஆம் ஆண்டு இந்தியா, பாகிஸ்தான் பிரிவினையின்போது ஹரப்பா மற்றும் மொகஞ்சதாரோ போன்ற முக்கிய தொல்லியல் இடங்கள் பாகிஸ்தான் நிலப்பரப்பிற்குள் சென்றன. இந்த சேர்க்கை இந்திய வரலாற்று ஆய்வுகளில் பேரிழப்பாகக் கருதப்பட்டது. தொன்மையான அடையாளச் சான்றுகள் கிடைத்த பகுதியை இழந்துவிட்டோமே என்று இந்திய ஆய்வாளர்கள் கருதினர். இதன் காரணமாகத்தான் இந்தியாவில் பல வகையான மேற்பரப்பு கள ஆய்வுகளும், அகழாய்வுகளும் மேற்கொள்ளப்பட்டன. அவ்வாறு செய்த காரணத்தினால் சிந்துவெளி நாகரிகம் எந்த எல்லை வரை எவ்வாறு பரவியுள்ளது என்பதை நம்மால் கண்டறிய முடிந்தது. மேலும் அந்த நாகரிகமானது மிகப் பரந்த நீண்ட நெடிய வரலாற்றையும் ஒற்றை நாகரிகத் தன்மைகளையும் கொண்ட தொகுப்பாக நமக்குக் காணப்படுகிறது.

சிந்து சமவெளி நாகரிக மக்கள் பெரும்பாலும் ஒரு நகர வாழ்க்கையை வாழ்ந்ததற்கான தடயங்கள், தொல்லியல் எச்சங்கள் நமக்கு கிடைத்துள்ளன. ஆனால் வேதகால

நாகரிகத்தைச் சேர்ந்த மக்கள் நாடோடி பழங்குடிகளாகவும் ஆடு மாடு மேய்க்கும் நபர்களாகவும் மட்டுமே இருந்துள்ளார்கள் என்பதற்கான சான்றுகள் நமக்கு எந்தவித அகழாய்வுகளிலும் தொல்லியல் ஆதாரங்களாகக் கிடைக்கவில்லை. வேதகால மக்கள் ஐரோப்பிய பகுதியிலும் மற்றும் மத்திய ஆசியாவின் வடக்கு பகுதிகளிலும் உள்ள ஸ்டெப்பி புல்வெளி பகுதியிலிருந்துதான் வந்தார்கள் என்பதும், அவர்கள் சுமார் கி.மு 1500ஆம் ஆண்டுகளுக்கு பின்புதான் இந்திய துணைக் கண்டப்பகுதிற்கு வந்திருக்க வேண்டும் என்றும் ஸ்பென்ஸர் வெல்ஸ் (*Spencer Wells*) என்கிற மரபியல் வரலாற்று ஆய்வறிஞர் ஆணித்தரமாக விளக்கிக் கூறுகின்றார்.

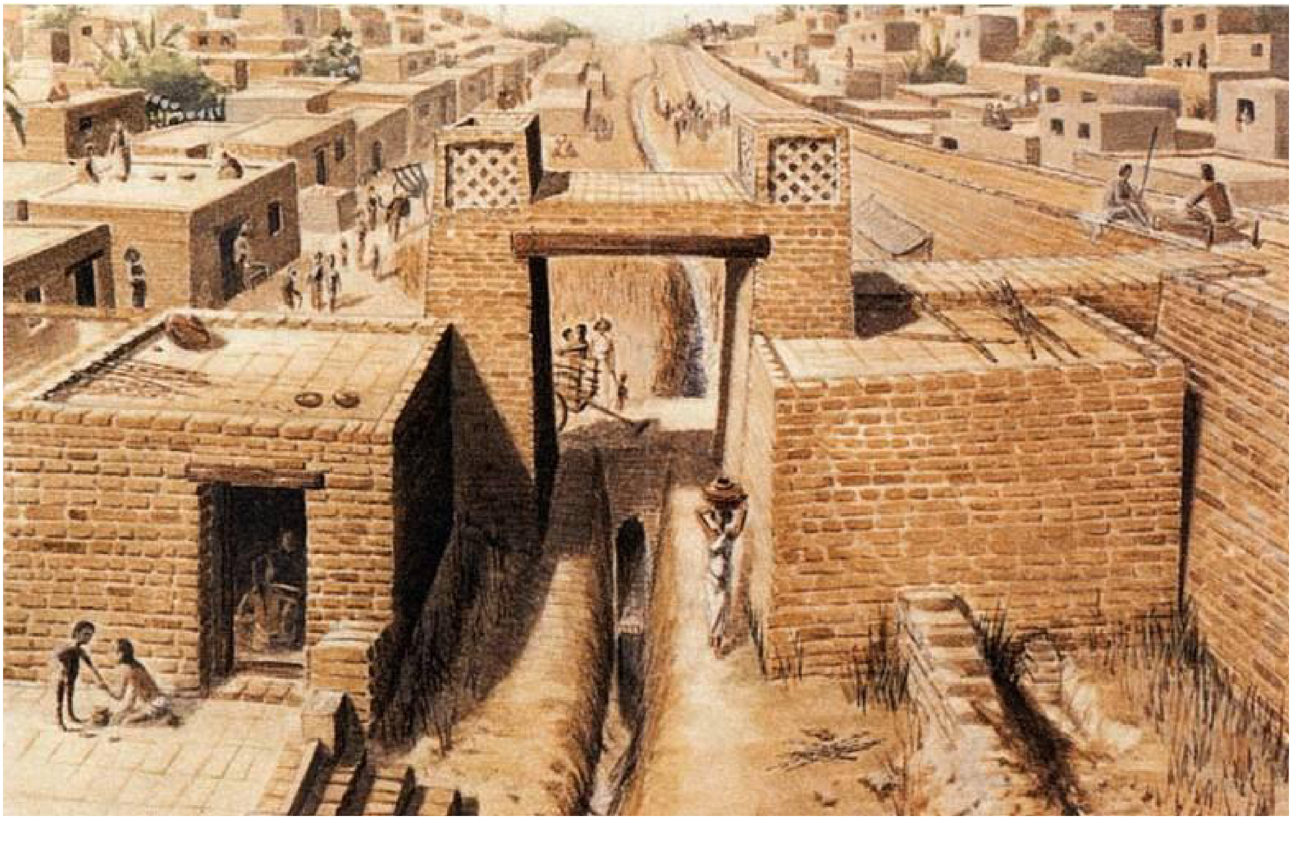
ஜேம்ஸ் பிரண்ஷிப் என்பவர் வரவில்லை என்றால் அசோகன் பிராமி என்ற எழுத்துருவை நம்மால் படித்தறிய முடிந்திருக்காது. அவர் ஒரு நாணயவியல் ஆய்வாளர்; பழைய நாணயங்களைக் கண்டறிந்து அவற்றில் காணப்படும் எழுத்து முறைகளை ஆய்வு செய்வது அவரின் மிக முக்கியப் பணியாக இருந்துள்ளது. இவர் முதன் முதலில் இரண்டு மொழி எழுத்துகள் உள்ள நாணயங்களை ஆய்வு செய்தார்; குறிப்பாக, கிரேக்க மற்றும் ரோமானிய எழுத்துப் பொறிப்புகளைக் கொண்ட நாணயத்தைப் பிராமி மற்றும் கரோஷ்டி எழுத்துகள் கொண்ட நாணயங்களுடன் ஒப்பீடு செய்தார்; அந்த ஆய்வு ஒரு புதுவிதமான வரலாற்றுக் கண்டுபிடிப்புகளை வெளிப்படுத்தியது. இதன் விளைவாகத்தான் பிராமி என்ற எழுத்து முறையையும் கரோஷ்டி எழுத்துருவையும் கண்டறிந்து அவற்றை சாஞ்சி பௌத்த ஸ்தூபிகளில் உள்ள பிராமி எழுத்தமைப்புகளுடன் ஒப்பிட்டுப் படிக்க ஆரம்பித்தார். அவர் முதன் முதலில் “தேவனாம்பியா பியதஷி” (*Devanampiya Piyadashi*) என்ற வார்த்தையைப் படித்து இது அசோகர் காலகட்டத்தைச் சார்ந்தது என்று விளக்கிக் கூறினார். அவர் இந்த ஆய்வின் முடிவுகளை 1834ஆம் ஆண்டில் வெளியிட்டார். அதன் பிறகு தான் பிராமி என்ற எழுத்துருவைப் படிக்கின்ற நிலை ஏற்பட்டது. தமிழகத்தில் காணப்பட்ட மாங்குளம் போன்ற இடங்களில் உள்ள பிராமி கல்வெட்டுகள் 1856ஆம் ஆண்டுகளில் ராபர்ட் சீவல் (*Rabert Sewell*) என்பவர் கண்டுபிடித்தார். ஆனால் அந்த கல்வெட்டை அவரால் முழுமையாகப் படிக்க முடியவில்லை. ஏனென்றால் அவர் அதை பிராகிருத மொழியில் தவறுதலாகப் படித்த காரணத்தால் அந்தக் கல்வெட்டுகளில் அனைத்தையும் அவரால் முழுமையாகப் படிக்க முடியவில்லை. ஆனால் சுமார் 75 ஆண்டுகளுக்குப் பின் வந்த கே.வி. சுப்பிரமணிய ஐயர் அந்தக் கல்வெட்டுகளை மறு ஆய்வுக்கு உட்படுத்தி அதைத் தமிழில் உள்ள சிறப்பு ழகரம், னகரம் போன்ற இலக்கண குறிப்பைக் கண்டறிந்து அதைத் தமிழ் மொழியில் படிக்கதூண்டியதோடு மட்டுமில்லாமல் அது தமிழ் மொழிக்குச் சொந்தமான கல்வெட்டு என்றும், அதைத் தமிழ் மொழியில்தான் படிக்க வேண்டும் என்றும் 1924ஆம் ஆண்டு குறிப்பிட்டார். மேலும் அவை தமிழ் பிராமி எழுத்துகள் என்று அறுதியிட்டுக் கூறினார். இவரின் முயற்சியின் காரணமாகத் தமிழ் கல்வெட்டு வாசித்தலில் ஒரு புதிய மறுமலர்ச்சி ஏற்பட்டது.

இதன் விளைவாகத் தமிழ் நாட்டில் தமிழ் பிராமி கல்வெட்டுகள் தமிழ் மொழியில் படித்தறியப்பட்டன. இந்த கண்டுபிடிப்பின் காரணமாக அசோகன் பிராமி காலகட்டத்தில் தமிழ் நாட்டில் தமிழ் மொழியில் தமிழ் பிராமி என்ற ஒரு எழுத்தைக் கொண்டு இங்கு எழுதி வந்தோம் என்ற செய்தியை அவர் நமக்கு விளக்கி கூறினார் இதனைக் கண்டறியவே நமக்கு நீண்ட நாட்கள் ஆகிவிட்டது. பிராமி என்று சொல்லப்படும் தொல் எழுத்துக் கல்வெட்டுகள் பெரும்பாலும் தமிழிலும் பிராகிருத மொழியிலும் மட்டுமே அதிக அளவு காணப்படுகின்றன. அரிதாகத்தான் சமஸ்கிருத மொழியில் காணப்படுகின்றன.

இந்தியாவில் சமஸ்கிருத மொழியில் எழுதப்பட்டுள்ள பிராமி எழுத்துபொறிப்பு கொண்ட முதல் கல்வெட்டு ராஜஸ்தான் மாநிலத்தில் அத்திபாடா கௌசாந்தி (*Hathibada Ghosundi*) என்ற இடத்தில் மட்டும்தான் கிடைத்துள்ளது, இதுவே சமஸ்கிருத மொழிக்குப் பழமையான ஆதாரமாகத் திகழ்கிறது. அதன் காலம் கி.மு ஒன்றாம் நூற்றாண்டு. அதற்குப் பின்னர் குப்தர் காலகட்டத்தில்தான் சமஸ்கிருத மொழிக் கல்வெட்டுகள் குப்தர் காலத்திய தேவநாகரி என்ற ஒரு எழுத்து முறையை பயன்படுத்தி எழுதுகின்ற முறையைக் கொண்டு வந்தார்கள். அதற்கு முன்பு வரை சமஸ்கிருதத்திற்கான எந்த ஒரு எழுத்துகளும் இந்தியாவில் கிடையாது.

சிந்து சமவெளி நாகரிகம் என்று சொல்லப்படுகின்ற நாகரிகத்திற்கான ஆய்வுகள் பல்வேறு காலகட்டங்களில் பல்வேறு அறிஞர்களால் மேற்கொள்ளப்பட்டன. முதன்முதலில் 1826ஆம் ஆண்டு சார்லஸ் மேசன் (*Charles Mason*) என்பவர் இங்கு கள ஆய்வுகள் மேற்கொண்டார். அப்பொழுது அங்கு தொல்லியல் மேடு இருந்ததென்று குறிப்பிடுகின்றார். அதேபோல் 1831ஆம் ஆண்டு அம்ரி என்ற இடத்தில் அலெக்சாண்டர் பர்ன்ஸ் (*Sir Alexander Burnes*) என்பவர் ஆய்வுகளை மேற்கொண்டு இந்த தொல்லியல் மேடு மூன்று மைல் சுற்றளவு கொண்டுள்ளதாகக் குறிப்பிட்டுள்ளார். அதன் பிறகு வந்த இந்திய தொல்லியல் ஆய்வுத்துறையின் முதல் தலைமை இயக்குநரான அலெக்சாண்டர் கன்னிங்ஹாம் (*Alexander Canningham*) 1853, 1856 மற்றும் 1875 ஆகிய ஆண்டுகளில் சிந்து சமவெளியில் பகுதியில் ஹரப்பா என்கிற இடத்தைப் பார்வையிட்டு ஆய்வுகளை மேற்கொண்டார். அவர் இது குறித்துச் சொல்லும் பொழுது, ஹரப்பா தொல்லியல் மேடு சுமார் 2.5 மைல் சுற்றளவு கொண்டதாகவும் அந்த மேட்டில் பல பகுதிகள் சிதைக்கப்பட்டிருந்தாகவும், அங்கு கிடைத்த செங்கற்களை லாகூர்-முல்டான் இடையே அமைக்கப்பட்ட இரயில் பாதைக்குப் பயன்படுத்தியதாகவும் குறிப்பிட்டுள்ளார்.

அதோடு அல்லாமல் அங்குள்ள தொல்லியல் மேட்டை *A,B,C,D* மற்றும் *E* என்று பெயரிட்டவரும் அவரே. அவரும் ஒரு சிறிய அளவு அகழாய்வை அந்தப் பகுதியில்



மேற்கொண்டார். ஆனால் அதன் காலத்தை அவரால் சரியாக அறிந்துகொள்ள முடியவில்லை. அந்த இடம் மௌரியர் காலத்துக்கு முந்தைய காலகட்டத்தைச் சேர்ந்ததாகத்தான் இருந்திருக்கக் கூடும் என்று அவர் தனது ஆய்வு அறிக்கையில் குறிப்பிட்டிருந்தார். பொதுவாக அலெக்சாண்டர் கன்னிங்ஹாம் வெளிநாட்டவர்களின் குறிப்புகளை அடிப்படையாக வைத்து பௌத்த இடங்களைத் தேடும் நோக்கில்தான் தன் ஆய்வினை மேற்கொண்டார்.

அதன் மூலமாக அவர் பாரூத், சாரநாத், சாஞ்சி, குஷிநகரம், கபிலவஸ்து (பிப்ரவா), சிரவஸ்தி, நாளந்தா, தட்சீலம் போன்ற புத்த ஸ்தூபாக்களைக் கண்டறிந்தார். இதன் காரணமாகத்தான் அவருக்குச் சிந்து சமவெளியைப் பற்றி புரிதல் இல்லாமல் இருந்தது. அதனால்தான் தன் ஆய்வறிக்கையில் இது ஒரு மௌரிய காலத்துக்கு முந்தைய காலகட்டமாக இருக்கலாம் எனவும் புத்தமடங்களாக இருக்கலாம் எனவும் கூறினார்.

அதற்குப் பின் வந்த கர்சன் பிரபுவின் ஆட்சிக் காலத்தில் 1902ஆம் ஆண்டில் சர். ஜான் மார்ஷல் (*Sir John Marshall*) என்வர் இந்தியத் தொல்பொருள் ஆய்வுத்துறையின் தலைமை இயக்குநராகப் பதவியேற்றார். இவருக்கு முன்பிருந்து ஆய்வு செய்த ஆய்வாளர்கள் அனைவரும் கலைப் பொருட்களைச் சேகரிக்க வேண்டும் என்ற எண்ணத்தில் தான் ஆய்வுகளை மேற்கொண்டார்கள். அச்சமயத்தில் நாகரிக வரலாறு மற்றும் வளர்ச்சியைப் பற்றி ஆய்வுகள் செய்ய வேண்டும் என்ற எண்ணம் அவர்களுக்கு இருந்ததில்லை. ஆனால் அதற்கு மாறாக இருந்தவர்தான் சர். ஜான் மார்ஷல். இவர் தன்னுடைய 26ஆம் வயதில் இந்தியத் தொல்லியல் ஆய்வுத்துறையின் தலைமை இயக்குநராக கர்சன் பிரபுவால் நியமிக்கப்பட்டார்.

இவரை நியமிக்க மிக முக்கியக் காரணம், இவர் எகிப்து பகுதியிலுள்ள புகழ்பெற்ற பிரமிடு நாகரிகங்களைப் மற்றும் கிரேக்க நாகரிகங்களை பற்றி அச்சமயம் ஆய்வுகள் செய்து கொண்டிருந்தார். சர் ஜான் மார்ஷல்தான் முதன்முதலில் முறையான அகழாய்வுகளைத் தட்சசீலாவில் துவங்கினார். அதன் பின்னர் ஹரப்பா மற்றும் மொகஞ்சதாரோ ஆகிய இடங்களில் அகழாய்வுகளை மேற்கொண்டார்.

அந்த அகழாய்வுகள் 1919ஆம் ஆண்டு தொடங்கப்பட்டன. அப்பொழுது அவரின் தலைமையில் தயாராம் சகாணி (*Dayaram Sahani*), ஆர்.டி பானர்ஜி (*Rakhal Das Banerji*) ஆகிய அறிஞர்கள் ஹரப்பா, மொகஞ்சதாரோவில் ஆய்வுகளை மேற்கொண்டார்கள். இவர்களின் சமகாலத்தில் லுகி பியோ தேஸ்ஸிடோரி (*Uigi Pio Tessitori*) என்கிற இத்தாலிய நாட்டைச்சேர்ந்தவர்ராஜஸ்தான்பகுதியில்களஆய்வை மேற்கொண்டார்.இவர்ஹரப்பா, மொகஞ்சதாரோவில் கிடைத்த பொருட்களைப் போல ஒரே மாதிரியான பொருட்களை ராஜஸ்தான் பகுதியில் கண்டறிந்தார். இதன் காரணமாக அவை அனைத்தும் ஒரே காலகட்டத்தைச் சார்ந்த நாகரிகமாக இருக்கலாம் என்றும் குறிப்பிட்டார். ஆனால் அந்த ஆய்வை அவரால் முழுமையாக முன்னெடுத்துச் செல்லமுடியவில்லை. துரதிஷ்டவசமாக நவம்பர் மாதம் 1919இல் அவர் நோய்வாய்ப்பட்டு காலமானார். ஹரப்பா மற்றும் மொஹஞ்சதாரோ ஆகிய இடங்களில் முறையான அகழ்வாய்வுகளைச் செய்துவரும் தயாராம் சகாணி மற்றும் ஆர்.டி. பானர்ஜி ஆகிய இரு அதிகாரிகள் இந்தப் பகுதியில் கிடைக்கின்ற பொருட்களைப் பற்றிய தகவல்களை சர் ஜான் மார்ஷலுக்கு அனுப்பி வைத்துக்கொண்டிருந்தனர். ஆனால் அவர்களால் இங்கு கண்டுபிடிக்கப்பட்ட தொல்லெச்சங்களைச் சரியாகக் காலக் கணிப்பு செய்ய முடியவில்லை. அவர்கள் அதை ஒரு மௌரிய காலத்திற்கு (*Pre-Mauryan*) முற்பட்ட வரலாற்று ஆதாரமாக

இருக்கலாம் என்றே கூறினர். அதற்கு மிக முக்கியக் காரணம் இந்திய வரலாறு என்பது வேதகாலத்திலிருந்துதான் தொடங்குகிறது என்று வில்லியம் ஜோன்ஸ் 1784ஆம் ஆண்டிலிருந்தே முன்வைத்து வந்த கருதுகோளை அவர்கள் மறுத்துச் செல்லவில்லை.

ஆனால் சர் ஜான் மார்ஷல் அவ்வாறு அல்ல. அவர் தான் கீழ் பணிபுரிந்த இரண்டு அதிகாரிகளை சிம்லாவில் உள்ள தொல்லியல் அலுவலகத்திற்கு அழைத்து ஹரப்பா மற்றும் மொகஞ்சதாரோவில் அவர்கள் கண்டெடுத்த தொல்பொருட்களைக் காண்பிக்கச் செய்தார், இந்த இரண்டு பேர்கள் கொண்டு வந்த தொல்பொருட்கள் அனைத்தையும் பார்வையிட்ட சர். ஜான் மார்ஷல் பெரும் கருத்தரங்கம் ஒன்றை ஏற்பாடு செய்திருந்தார்.

அதில் குறிப்பாக ஹரப்பா மற்றும் மொகஞ்சதாரோவில் உள்ள கட்டிட அமைப்புகள், தெருக்கள், வீட்டின் அறை, குளியலறை, பொதுப் பயன்பாட்டிற்காகக் கட்டப்பட்ட கட்டிட வரைபடத்தை ஆராய்ந்ததோடு அல்லாமல் அவர்களிடம் இருந்த தொல் மேடுகளைப் பற்றி குறிப்புகள், புதைப்புமுறை மற்றும் புதைப்பிடத்தைப் பற்றிய செய்திகளை ஆராய்ந்தார். அதோடு அல்லாமல் கிடைத்த முத்திரைகள், மணிகள், சூதுபவள மணிகள், அரியவகை கற்களால் செய்யப்பட்ட மணிகள், செம்பு கருவிகள் மற்றும் பல வகையான பானை ஓடுகள் ஆகியவற்றை அவர் பார்வையிட்டு இவை அனைத்தும் சமகாலத்தைச் சார்ந்தவை என்று அறுதியிட்டு கூறியதோடு அல்லாமல் இது வேதகாலத்துக்கு முந்தைய நாகரிகம் என்று உறுதிபட விளக்கம் அளித்தார். இங்கு கிடைத்த அனைத்து சான்றுகளுமே திராவிட நாகரிகத்தைச் சேர்ந்ததாக மட்டுமே இருந்திருக்க முடியும் என்றார். அதன் பின் வந்தவர்கள், குறிப்பாக வரலாற்றுப் பேரறிஞர்

சுமித்குமார் சட்டர்ஜி (*Sumit Kumar Chatterji*) அவர்கள் அதே கருத்தை ஆணித்தரமாக எடுத்துரைத்தார்.

வேத காலத்தில் மக்கள் என்பவர்கள் பொதுவாக ஆரியர்கள் என்று அழைக்கப்பட்டார்கள். அவர்கள் கிழக்கு ஐரோப்பிய நாடுகள் மற்றும் வடக்கு மத்திய ஆசிய நாடுகளில் உள்ள ஸ்டெப்பி புல்வெளி பகுதியில் இருந்து வந்த ஆடு, மாடுகளை மேய்க்கும் நாடோடி மக்கள் ஆவார்கள். அவர்கள் எங்கும் நிலையாக தங்கி வாழ்ந்ததற்கான சான்றுகளும் நமக்கு இன்று வரை எந்த தொல்லிடத்திலும் தொல்லியல் எச்சங்களிலும் கிடைக்கவில்லை.

வேதகாலத்தைச் சேர்ந்த மக்கள் இந்தோ-ஐரோப்பிய இனக் குடிகளாக தான் இருக்க வேண்டும் என்று பல அரிய தகவல்கள் நமக்கு ஈரான், ஈராக் பகுதியில் கிடைக்கப்பட்டுள்ளது. காஸ்சைட் கல்வெட்டு, மிட்டானிக் கல்வெட்டு மற்றும் போகஜ் கல்வெட்டு போன்றவை சான்று கூறுகின்றன. இந்த கல்வெட்டுகளின் மூலம் ஐரோப்பிய மற்றும் வடக்கு மத்திய ஆசிய நாட்டுப்பகுதியிலிருந்து குடியேறியவர்கள் ஆரியர்கள் என்று வலுவாக சான்றுகள் மூலம் எடுத்து கூறுகின்றார்கள். பிற்கால வேதகாலத்தில் பேசப்பட்ட சமஸ்கிருத மொழியில் கூட முண்டா மற்றும் திராவிட மொழிகளைச் சார்ந்த எழுத்தமைவுகள் அதிகம் காணப்படுகிறது. இதன் மூலம் ஆரியர்கள் இம்மண்ணில் உள்ள பூர்வகுடிகளுடன் கலந்து குடியேறியவர்களே என்று நமக்கு உறுதியான சான்றுகள் விளக்குகின்றன, பண்டைய கால குடியேறிய மக்களைக் கண்டறிய தற்போது மரபணு அறிவியல் ஆய்வுகள் பெரிதும் பயன்படுகின்றது. குறிப்பாகச் சொல்லவேண்டும் என்றால் எம்17 (M17) என்ற மரபணு பெரும்பாலும் இந்தோ-ஐரோப்பிய மொழிகளைப் பேசுபவர்களிடம் மட்டுமே காணப்படுகிறது. அதிலும் ஆர்1ஏ1 (R1A1) என்ற மரபணு கொண்டவர்கள் தொடக்க கால வரலாற்றுக் காலத்தில் இந்தியாவிற்குக் கடைசியாக குடியேறியவர்கள் என்று கருதப்படுகிறார்கள்.

இதை மெய்ப்பிக்கும் வகையில் ஸ்பென்சர் வெல்ஸ் (Spencer Wells) போன்ற மரபணு அறிஞர்கள் இந்தியாவில் ஒரு விரிவான ஆய்வை மேற்கொண்டதில் சுமார் 60,000 ஆண்டுகளுக்கு முன்பாக இந்தியாவிற்கு வந்து தமிழகத்தில் இன்று வரை வாழ்ந்துவரும் மக்களைப் பற்றி செய்தி மனித மரபணு வரலாற்றில் ஒரு முக்கியத் தகவல்.

த. விருமாண்டி என்பவர் ஆண்டிபட்டி வட்டம் மதுரை மாவட்டத்தில் உள்ள ஜோதி மாணிக்கபுரத்தைச் சேர்ந்தவர். இன்றளவும் நம்முடன் வாழ்ந்து வருகிறார். இந்தியாவில் குடியேறிய பழங்காலத்து மனிதர்களில் 60,000 ஆண்டுகளுக்கு முன்பு ஆப்பிரிக்காவை விட்டு வெளியேறி முதலில் குடியேறிய மக்களின் மரபணுவைக் கொண்டவர் அவர் என்பது மிக முக்கியமானதாகக் கருதப்படுகிறது.

இந்த மரபணுவிற்கு எம்.130 (M130) என்ற குறியீட்டைக் கொடுத்துள்ளார்கள். இதைக் கண்டறிந்த பெருமை மதுரை காமராசர் பல்கலைக்கழகத்தைச் சேர்ந்த பேராசிரியர் ரா. பிச்சப்பன் (Prof. R.Pichappan) அவர்களைச் சாரும். ஆப்பிரிக்காவில் இருந்து முதன்முதலில் வெளியேறி குடியேறிய மரபணு வகையைச் சார்ந்ததாக அது அறிவுலகில் கருதப்படுகின்றது, அதன் பிறகு 30 ஆயிரம் ஆண்டுகளுக்கு முன்பும், பின் 10,000 ஆண்டுகளுக்கு முன்பும் குடியேறிய மனிதர்களின் மரபணுக்கள் எம்.69 (M.69) எம்.172 (M.172), எம்.20 (M.20) இந்தியத் துணைக்கண்டப் பகுதிகளில் அதிகம் காணப்படுகின்றன இந்த மரபணு வகைகள் அறிவியல் ஆய்வுகளின் மூலமாக நமக்கு புலப்படுகின்றன. இதன் மூலம் அறிகின்ற செய்தி என்னவென்றால் பழந்தொல் குடிமக்கள் பல ஆண்டு காலமாக இந்திய நிலப்பகுதிகளில் வாழ்ந்து வருகின்றார்கள் என்பதுதான்.

அந்தப் பழங்குடிகளில் ஆதி தொல் தென்னிந்திய பழங்குடிகளும், (Ancient Ancestral South Indian) (AASI), தொல் தென்னிந்திய பழங்குடிகளும், (Ancestral South Indian) (ASI) இணைந்துதான் சிந்துசமவெளி நாகரிகத்தை உருவாக்கியுள்ளார்கள் என்ற கருத்தும் நமக்கு இப்பொழுது மரபணு ஆய்வுகளின் அடிப்படையில் தெரிய வருகிறது, இதை மெய்ப்பிக்கும்வகையில்ராக்கிகடி என்றஇடத்தில்கிடைத்த மனிதனின்எலும்புக்கூட்டில் செய்யப்பட்ட மரபணு சோதனை உறுதிப்படுத்தும் வகையில் ஆய்வுகளின் முடிவுகள் காணப்படுகின்றன. இந்த ஆய்விற்கு முக்கியமாக விளங்கியது ஹரியாண மாநிலத்தில் உள்ள ராக்கிகடி என்றழைக்கப்படும் ஊராகும். இதன் சிறப்பை நான் முதலில் குறிப்பிட வேண்டும். 1924ஆம் ஆண்டு கண்டுபிடிக்கப்பட்ட சிந்து சமவெளி நாகரிக ஆய்வுகள் இன்றளவும் நடைபெறுவதற்கு மிக முக்கியக் காரணியாக விளங்கும் ஹாரப்பா மற்றும் மொகஞ்சதாரோ போன்ற இடங்கள் இந்தியப் பிரிவினையின் போது பாகிஸ்தானோடு சென்றபின் வெற்றிடம் ஏற்பட்டது.

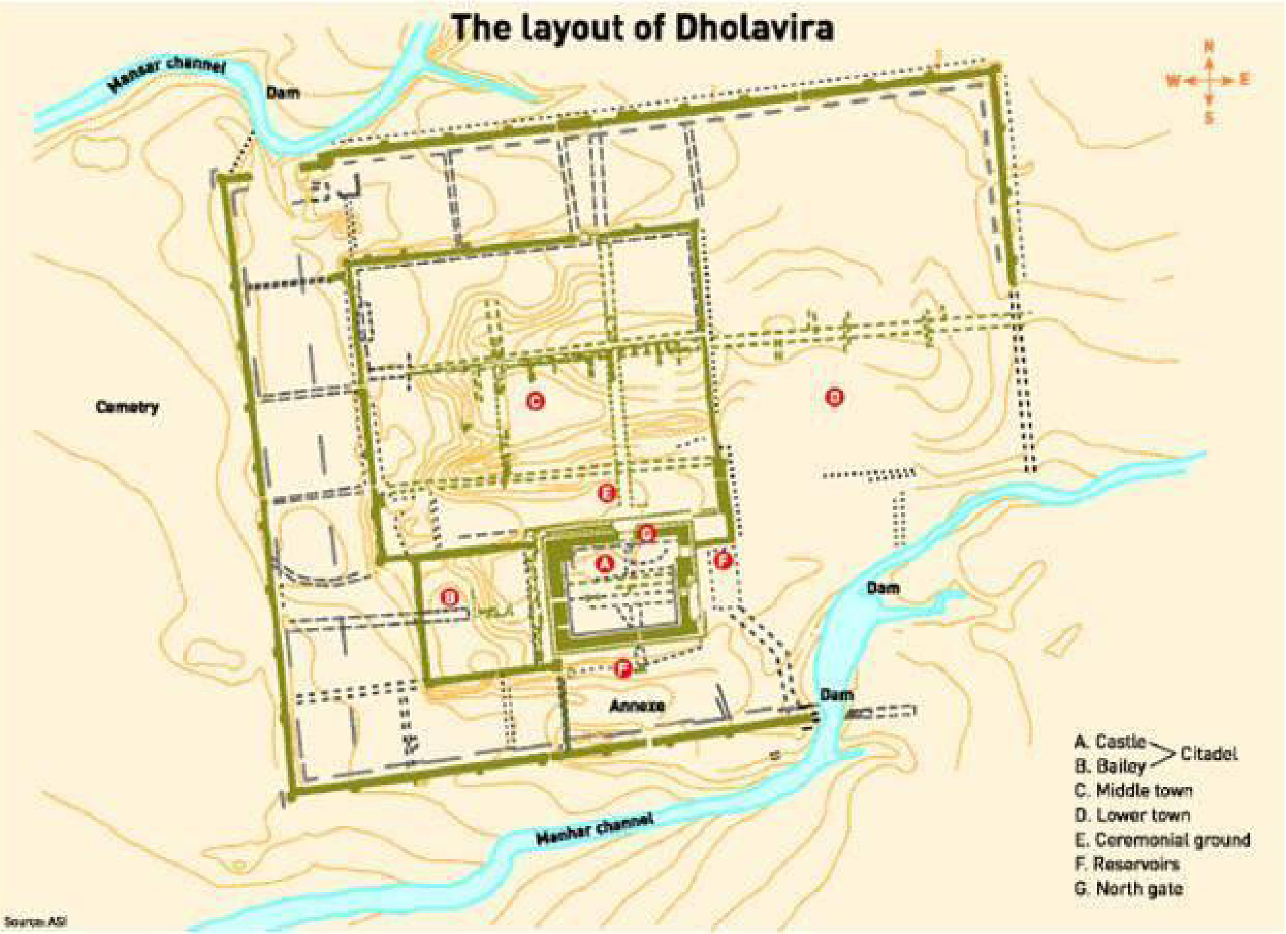
சிந்து சமவெளி ஆய்வுகள் இன்று வரை தொடர்வதற்கு மிகவும் இன்றியமையாத காரணியாக அமைந்தது. இதன் காரணமாய் இன்றுவரை கிட்டத்தட்ட சுமார் பத்தா யிரத்திற்கும் மேற்பட்ட சிந்து சமவெளி நாகரிகத்திற்குரிய இடங்கள் கள ஆய்வுகளின் மூலம் கண்டறியப்பட்டுள்ளன. அவற்றுள் சுமார் 150 முதல் 200க்கு மேற்பட்ட இடங்கள் இன்று வரை அகழாய்வுகள் செய்யப்பட்டுள்ளன என்று கூறினால் அது மிகை ஆகாது.

அந்த சூழ்நிலையில் ஹரியாணா மாநிலத்தில் உள்ள ராக்கிகடி என்ற இடம் 1997 முதல் 2000 வரை மூன்று ஆண்டுகள் அகழாய்வுக்கு உட்படுத்தப்பட்டது. அந்த அகழாய்விந் தலைவராக இருந்தவர் முனைவர். அமரேந்திரநாத் (Amarendra Nath) என்ற அறிஞர். நான் மற்றும் என் நண்பர் திரு. அறவாழி மற்றும் என்னுடைய முன்னவர் சுனில் குமார் ஜா ஆகியோர் 1999 முதல் 2000 வரை நடைபெற்ற ஆய்வில் கலந்து கொள்கின்ற

வாய்ப்பைப் பெற்றிருந்தோம், அப்போதுதான் எங்களுக்கு அந்த புதைப்பிட இடத்தை கண்டுபிடிக்கின்ற வாய்ப்பு கிடைத்தது, அதற்கு மிக முக்கியக் காரணம் 1997 மற்றும் 1998ஆம் ஆண்டில் செய்யப்பட்ட அகழாய்வில் தவறுதலாக ராக்கிகடியில் உள்ள கீழ் நகரம் (*Lower Town*) என்று அழைக்கப்படும் தொழிற்சாலைகளைக் கொண்ட பகுதியில், குறிப்பாக சொல்ல வேண்டும் என்றால், தொல்லியல் மேடு *RGR-1* என்று அழைக்கப்பட்டது. அந்த மேட்டில் புதைப்பிடம் கிடைத்து விட்டதாக தவறுதலாக அறிவித்துவிட்டனர். பொதுவாக சிந்துவெளி மக்கள் புதைப்பிடத்தை தங்களுடைய இருப்பிடங்கள் இருக்கும் பகுதியில் ஏற்படுத்தியது கிடையாது. நகரத்திற்கு வெளியே புதைப்பிடத்தை அமைப்பது என்பது அவர்களின் பொதுவான வழக்கமாக இருந்தது. அந்த வகையில் இங்கு ராக்கிகாடி என்ற நகரத்திற்கு வெளியே தான் புதைப்பிடம் இருக்க வேண்டும்.

அதைக் கண்டறிந்து ஆய்வு செய்வதை விடுத்து, நகரத்திற்கு உள்ளே, குறிப்பாக கீழ் நகரம் பகுதியில்தான் பிற்காலத்தில், அதாவது மத்திய காலத்தில் (*Medieval Period*) வந்தவர்கள் புதைத்த இடத்தை சிந்துவெளி மக்களின் புதைப்பிடம் என்று தவறுதலாக அறிவித்துவிட்டனர். இது மிகப் பெரிய விமர்சனத்தை உண்டாக்கியது. அந்த சமயத்தில்தான் மூன்றாம் ஆண்டு அகழாய்வில் நாங்கள் மூவரும் *RGR-1* என்ற கீழ் நகரம் பகுதியில் வேலை செய்கின்ற வாய்ப்பைப் பெற்றோம்.

அப்பொழுது நாங்கள் எங்களுடைய தங்குமிடத்திற்குக் கோதுமை வயல்களின் வழியே நடந்து செல்வது வழக்கம். அப்பொழுது எங்களுக்குத் தென்னிந்தியாவில் பலவகையான



பெருங்கற்காலப் புதைப்பிடங்களை பார்த்த அனுபவம் உள்ள காரணத்தினால் அந்த கோதுமை வயல்களில் நடந்து செல்லும் போது கூட்டம் கூட்டமாக எறும்புகள் நிறைந்த பகுதியைக் கண்டோம். அது எதனை குறிக்கிறது என்றால் பொதுவாக பழைய புதைப்பிடங்களில் புதைப்பதற்குரிய பொருட்கள் மட்கலன்களில் வைத்து புதைப்பது என்பது வழக்கம்.

அந்த மட்கலங்களில் உள்ள பொருட்கள் மக்கியபின் காலியாக உள்ள மட்களங்களில் எறும்புகள் தங்களுடைய குடியிருப்புகளை ஏற்படுத்திக் கொள்வது என்பது ஒரு இயற்கையான செயல். இந்தச் செயல்கள் இந்தக் கோதுமை வயல்களில் நடந்ததைப் பார்த்து இந்தப் பகுதி சிந்துவெளி மக்களின் புதைப்பிடமாக இருந்ததற்கான வாய்ப்புகள் உண்டு என்று கருதி *2000* ஆம் ஆண்டு அந்த பகுதியில் சிந்துவெளி மக்களின் புதைப்பிடங்களை நாங்கள் மூன்று பேரும் சேர்ந்து கண்டுபிடித்தோம், அப்பொழுது டிஎன்ஏ (*DNA*) ஆய்வு செய்வதற்கான வசதிகள் இல்லாதபோதும் அந்தப் பகுதியில் ஐந்து புதைக்குழிகள் தோண்டினோம். அதில் ஒரு புதைகுழியில் பெண்ணின் முழு எலும்புக்கூட்டுடன் தங்கச் சங்கிலி, கைகளில் சங்கு வளையல்கள் அணிந்த நிலையில் கிடைத்தது.

அந்த ஹரப்பா நாகரிகப் பெண்ணின் எலும்புக் கூடு தற்போது புதுடெல்லியில் உள்ள தேசிய அருங்காட்சியகத்தில் காட்சிப்படுத்தப்பட்டுள்ளது. அதே இடத்தில் தான் 2014ஆம் ஆண்டு பேராசிரியர் வசந்த் ஷிண்டே (*Vasanth Shinde*) என்பவர் அகழாய்வுகள்

மேற்கொண்டு அங்குள்ள சிந்து சமவெளி மக்களின் 56 புதைகுழிகளைத் தோண்டி தொல் எலும்புப் படிமங்களை எடுத்தார்.

அந்தத் தொல்படிமங்களிலிருந்து மரபணுக்களைச் சேகரித்து அதை மரபணு ஆய்வுக்கு உட்படுத்தினார்கள், அந்த மரபணு ஆய்வின் மூலம் கிடைக்கின்ற செய்தி என்னவென்றால் அது ஆரிய மரபணுவான R1A1 என்ற மரபணு இல்லை என்பதுதான் அதன் முக்கிய கண்டுபிடிப்பாகும்.

மத்திய தரைக்கடல் நாட்டுப் பகுதியைச் சார்ந்த விவசாயத்தை அறிந்த மக்கள் சுமார் 10,000 ஆண்டுவாக்கில் இந்தியப் பகுதிக்கு வந்து இங்குள்ள ஆதி தொல் தென்னிந்திய பழங்குடி (*Ancient Ancestral South India*) (*AASI*) மக்களுடன் கலந்து இந்த நாகரிகத்தை உருவாக்கினர் என்ற செய்தியை இந்த மரபணு ஆய்வின் முடிவுகள் வெளிப்படுத்துகின்றன. இதை வெளிப்படையாகச் சொல்வதற்கு அதை கண்டுபிடித்த அறிஞரே முன்வரவில்லை என்பதுதான் உண்மை. இதன் காரணமாகத்தான் சிந்துவெளி மக்கள் ஆரியர்கள் அல்ல, அவர்கள் திராவிட இனத்தை சார்ந்தவர்கள் என்பதை அறிவியல் முறையினால் செய்யப்பட்ட ஆய்வு உறுதியாகக் காட்டுகிறது.

தற்சமயம் வட இந்தியாவில் அகழாய்வுகளின் மூலம் பெறப்பட்ட பழுப்பு நிறப் பானை ஓடுகளை (*Ochre Colour Pottery*) வேதகால பானை ஓடுகளுடன் ஒப்பிடும் முயற்சி நடந்து வருகிறது. இத்தகையா ஓடுகள் சிந்துவெளி நாகரிகக் காலத்தில் கடைசிப் பகுதியான செப்பு புதையல் காலம் எனப்படும் (*CopperHoardCulture*), சிந்துவெளி மக்கள் கிழக்கு மற்றும் தெற்கு நோக்கி நகர்ந்த போது இருந்து வந்த கலாச்சாரமாகும். இந்தக் கலாச்சாரத்தில் பெண் தெய்வ வழிபாட்டு முறை மிகவும் பிரபலமாக இருந்து வந்துள்ளது. இதனை மானுட உருவங்கள் (*Anthropomorphic Figure*) என்று அழைப்பர். அது சிந்துவெளி நாகரிகம் அழிகின்ற சமயத்தில் உருவான ஒரு தொடர் நாகரிகம் ஆகும். ஓவியம் தீட்டப்பட்ட சாம்பல் நிற மட்பாண்டங்கள் (*Polished Gray Ware*) வேதகால குரு, பாஞ்சால அரசர்களோடு தொடர்புபடுத்தப்படுகின்றது. குறிப்பாகச் சொல்ல வேண்டும் என்றால், அது மேற்கு உத்தர பிரதேசப் பகுதியைக் குறிப்பதாகும்.

அதை மகாபாரத காலத்திய பானை ஓடுகள் என்று பி.பி. லால் (*B.B. Lal*) என்ற தொல்லியல் அறிஞர் குறிப்பிட்டார். ஆனால் அக்காலத்தை சேர்ந்த மட்பாண்டங்கள் இரும்பு காலத்தை சார்ந்த நாகரிகமாக வட இந்தியப்பகுதியில் கருதப்பட்டது, ஆனால் அதற்கு முந்தியதாக, தமிழகத்தில் சமீப காலத்தில் நடந்த அகழ்வாய்வுகளின் மூலம் இரும்பின் பயன்பட்டை தமிழர்கள் கிட்டத்தட்ட கி.மு 2172ஆம் ஆண்டின் முன்பிருந்தே அறிந்திருந்தார்கள் என்ற செய்தியை தெலுங்கனூர், மேல்சிறுவலூர் மற்றும் மயிலாடும்பாறை அகழாய்வுகள் நமக்கு நன்றாகப் புலப்படுத்துகின்றன. இன்றுவரையிலும் ஆரியர்கள் குறித்தான கல்வெட்டுகள் மத்திய ஆசியப் பகுதியான ஈரான், ஈராக் பகுதியில் கிடைக்கின்றன. ஆனால் இந்தியாவில் அவர்களின் வருகை குறித்தும் அவர்களின் வேதகால நாகரிகத்தை பற்றி அறிந்தற்கான எந்த ஒரு தொல்லியல் ஆதாரமும் நமக்கு இன்று வரை கிடைக்கப்பெறவில்லை. குறிப்பாக வரலாற்று ஆய்வாளரான மேக்ஸ்முல்லர் அவர்கள் வேதங்களின் தொகுப்பை கணக்கில் கொண்டு தன் கருத்தாக (*Hypothetical*) கி.மு 1500லிருந்து வேதகாலம் தொடங்கியதாக எடுத்துக்கூறினார். ஆனால் அவரின் கருத்து அறிவியல் பார்வையில் சொல்லப்பட்ட விளக்கம் அல்ல. வேதம் மிகவும் பழமையானது, அது இந்தோ-ஐரோப்பிய மொழிகளுடன் தொடர்புடையது என்கிற கருத்தின் அடிப்படையில்தான்

அவர் அவ்வாறு கூறினார். அதற்கு எவ்வித வரலாற்று சான்றும் கிடையாது, ஆனால் அவரின் கருத்தை வைத்துக்கொண்டு வட இந்தியா வரலாற்று அறிஞர்கள் சிலர் வேத காலமே இந்தியாவின் தொன்மையான காலம் என்று சொல்வது உண்மைக்குப் புறம்பானச் செயலாகும்.

சிந்து சமவெளிப் பகுதியில் சிவப்பு வண்ணத்தில் கருப்பு வண்ணம் தீட்டப்பட்ட பானை ஓடுகள் (*Black on Red Ware*) தான் அதிகம் கிடைத்தன. இவை பிற்கால சிந்து சமவெளிப் பகுதியில், குறிப்பாக குஜராத், ராஜஸ்தான் போன்ற பகுதிகளில், பெருமளவில் காணப்படுகின்றன. அவை பிற்கால சிந்து சமவெளி பண்பாட்டின் தொடர்ச்சியாகும். பொதுவாக இந்தக் கருப்பு சிவப்பு பானைகள் இந்தியாவின் அனைத்து பகுதிகளும் கிடைக்கின்றன. அதுவும் தென்னிந்தியப் பகுதியில் மிகவும் அதிகமாக கிடைக்கப்படுகின்றன.

தென்னிந்தியாவில் இதனை பெருங்கற்கால பானை (*Megalithic Pottery*) என்று அழைப்பர். இந்தப் பானையின் பரவலாக்கம் திராவிட இனப் பரவலாக்கத்தை எடுத்துக் காண்பிக்கின்ற மிக முக்கிய தொல்லியல் ஆதாரமாகும். இதன் மூலம் தான் இந்தியாவில் உள்ள அனைத்து பகுதிகளுமே திராவிட இனமக்கள் வாழ்ந்த பகுதிக்கு சொந்தமானதாக கருதப்படுகிறது. சிந்து சமவெளிப் பகுதிகளிலும் காளிபங்கன் மற்றும் ராக்கிகடி போன்ற பகுதிகளிலும் கிடைக்கும் வீட்டின் அடுப்புகளை யாககுண்டங்களாகச் சித்தரிக்க நினைத்தார்கள். ஆனால் அந்த ஒரு பெரும் முயற்சியும் அவர்களுக்கு எந்தப் பயனையும் அளிக்கவில்லை. சாதாரண அடுப்பு எவ்வாறாக யாககுண்டமாக மாற்ற முடியும் என்ற ஒரு புரிதல் இல்லாமல் பல வரலாற்று அறிஞர்கள் செயல்படுவது நகைப்பிற்குரியதாகும்.

இந்தியத் துணைக் கண்டத்தில் நுழைந்த ஆரியர்கள் தொடக்க கால வேதகாலத்தில், அதாவது ரிக் வேத காலத்தில் ஏழு நதிகள் பாய்ந்த சப்த சிந்து என்ற பகுதியான பஞ்சாப் பகுதியில்தான் குடியேறினார்கள். குறிப்பாக ஹரியாணா, பஞ்சாப் மற்றும் மேற்கு உத்தர பிரதேசம் போன்ற பகுதிகளில் அவர்கள் வாழ்ந்ததற்க்கான தகவல்கள் நமக்கு கிடைக்கின்றன. அந்தப் பகுதியே ஆரியவர்த்தம் என்று அழைக்கப்படுகிறது. அந்த பகுதியில் மட்டும் தான் மேலே குறிப்பிட்ட ஓவியம் தீட்டப்பட்ட சாம்பல் நிற மட்பாண்டங்கள் (*Painted Gray Ware*) கிடைக்கின்றன. வேறு எங்கும் இவ்வகையான மட்பாண்டங்கள் கிடைப்பதில்லை. சிந்து சமவெளி நாகரிகத்தை சரஸ்வதி போன்ற வேதகால நதிகளுடன் தொடர்புப்படுத்துகிறார்கள். புதிய கட்டுக்கதையாக சிந்து சமவெளி நாகரிகத்தை சிந்து சரஸ்வதி நாகரிகம் என்று அழைக்கத் தொடங்கி விட்டார்கள். அதற்கு அவர்கள் சொல்லும் முக்கிய காரணம் ரிக் வேதத்தில் சரஸ்வதி நதியை பற்றிய குறிப்புகள் இருக்கின்றன. அந்த நதி கண்ணுக்கு புலப்படாமல் மறைந்துவிட்டது. அந்தப் பகுதியில்தான் சிந்து சமவெளி நாகரிகங்களின் பல தொல் நகரங்கள் உள்ளன. அதனால்தான் அதனை பெயர் மாற்றம் செய்து அழைக்கின்றோம் என்று கூறுகின்றனர்.

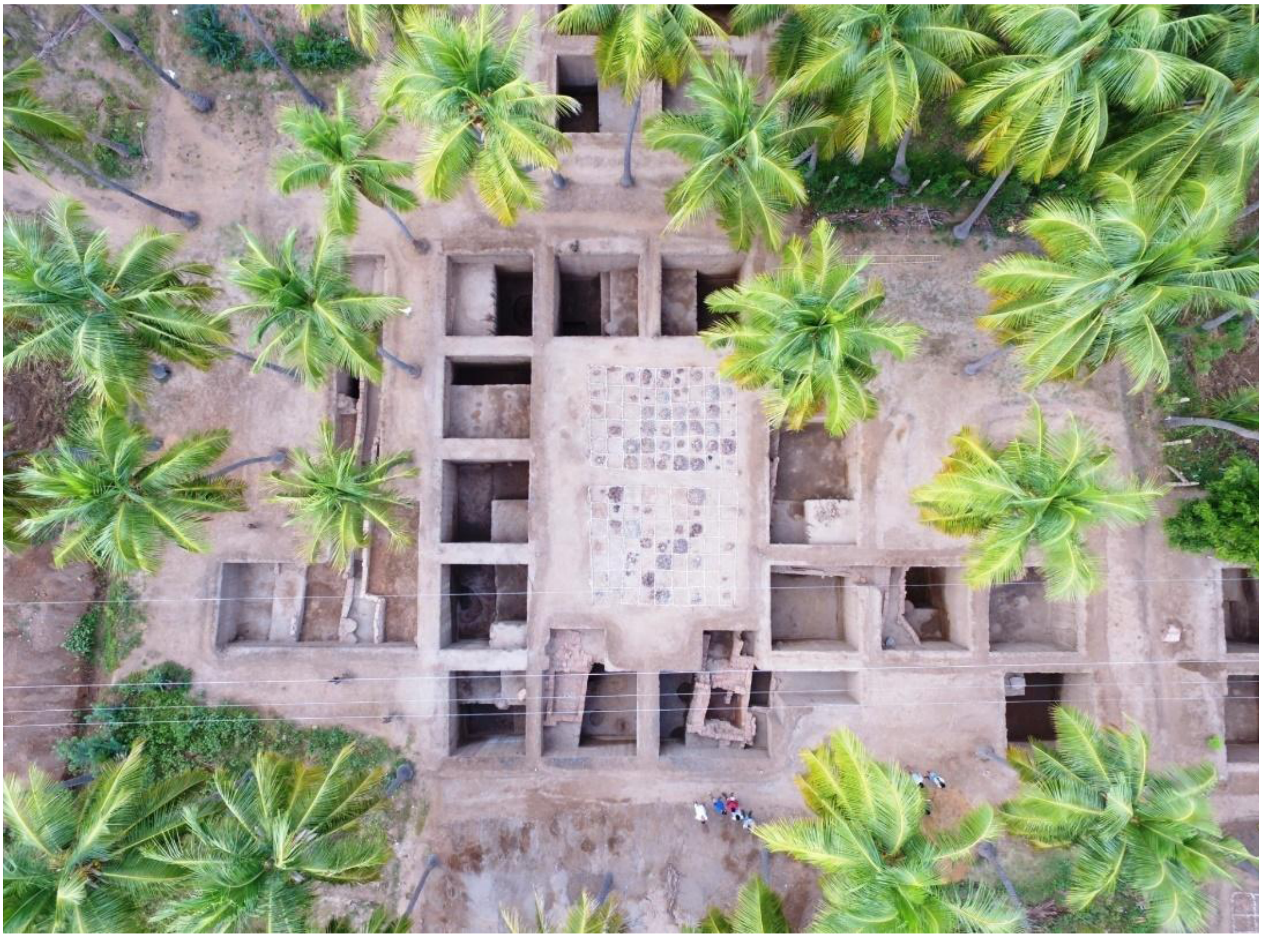
அறிஞர்கள் கருத்துப்படி ரிக் வேதகால சரஸ்வதி என்ற நதி பாரசீகப் பகுதிகளில் பாய்ந்தது. அவர்கள் செல்லுகின்ற இடமெல்லாம் அந்த பெயர் வைப்பது அவர்களின் பழக்கங்களில் ஒன்றாக கருதப்படுகிறது அந்த அடிப்படைப் பெயரை திரித்து ஒரு பழம்பெரும் நாகரிகத்தின் பெயரை அழைக்கின்ற செயலில் தற்பொழுது ஈடுபட்டுள்ளனர். ஆனால் ராஜஸ்தான் பகுதியில் அமைந்துள்ள காகர் மற்றும் ஹக்ரா நதி,கரையை என்பதை தான் தற்பொழுது சிந்து சரஸ்வதி நதியென்று பெயர் மாற்றி அழைக்கின்றார்கள். அது மட்டுமல்லாமல், நமக்கு சிந்து வெளிப்பகுதிகளில் கிடைக்கப்படுகின்ற பசுபதி உருவம் பொறித்த முத்திரையும் கூட சிவன் என்ற கடவுளை குறித்ததாக வட இந்திய வரலாற்று அறிஞர்கள் கருதுகின்றனர். ஏனென்றால் அமர்ந்த நிலையில் காணப்படும் பசுபதியின் தலையின் மேல் இரண்டு எருமைக் கொம்புகளை கொண்ட மகுடம் முத்திரையில் பொறிக்கப்பட்டுள்ளது. அந்த வகையான மகுடத்தை தற்போது கூட வடகிழக்கு மாநிலங்களில் உள்ள பழங்குடி மக்களின் பண்பாட்டு நிகழ்வுகளில் பயன்படுத்திக் கொண்டு வருகின்றார்கள். நாகலாந்து, மிசோரம் போன்ற பகுதிகளில் இருக்கும் பழங்குடி மக்கள் அவர்களின் திருவிழா காலகட்டத்தில் எருமை மாட்டுக் கொம்புகள் கூடிய மகுடத்தை தலையில் வைத்து ஆடல்பாடலுடன் திருவிழாவைக் கொண்டாடி வருவதை கண்கூடாக தற்போது கூட பார்க்கலாம். ஆண்குறி மற்றும் பெண் தெய்வ வழிபாடு என்பது சிந்துவெளி மக்களின் மிக முக்கிய வழிபாட்டு முறையாகும், அந்த வழிபாட்டின் முக்கிய காரணம் வளமையை பெருக்குகின்ற வழிபாடாக கருதப்பட்டதே ஆகும். அதை பின்னாளில் வந்த ஆரியர்கள் தன்வயப்படுத்திக் கொண்டனர்.

ஆகையால் இந்த மண்ணின் வழிபாட்டு முறை என்பது தொடர்ந்து வரும் ஒரு நாகரிகத்தின் பண்பாட்டின் வழிபாட்டு முறையாக மட்டும் தான் இருந்திருக்கக்கூடும் என நமக்கு உணர்த்துகின்றது.

ரிக் வேதகால மக்கள் இந்தியப் பகுதியில் குடியேறிய ஆரம்ப காலத்தில் அவர்கள் ஆண் கடவுளை மட்டும்தான் அதிக அளவு வழிபடத் தொடங்கினர். இந்திரன், அக்னி, சோமன், மித்திரன், வருணன், வாயு போன்ற ஆண் கடவுளர்கள் மட்டும் வழிபாட்டு முறையில் முதன்மை வகித்தனர். பிற்கால வேதகாலத்தில் பெண் கடவுளையும் வழிபட்டுள்ள

செய்திகள் நமக்கு கிடைக்கின்றது அதிதி என்ற பரந்த வெளியும், உஷா என்ற விடியலையும் பெண் கடவுள்களாக வழிபட்டுள்ளார்கள். ஆனால் பின் வேதகாலத்தில் அவர்கள் இந்த மண்ணின் மரபுக் கடவுள்களை தன்வயப்படுத்திக் கொள்கின்ற செயல்களில் அதிகம் நாட்டம் கொண்டனர். இதன் பிரதிபலிப்பாக தமிழகப் பகுதிகளில் காணப்படும் கோவில்களில் பண்டைய காலத்தில் ஆண் தெய்வ மூலவர் சன்னதிகளுக்கு முக்கியத்துவம் கொடுக்கப்பட்டது. பின்வரும் காலகட்டத்தில்தான் பெண் தெய்வத்தை அவர்கள் வணங்கத் தொடங்கினார்கள் ஏனென்றால் திராவிட மரபில் வந்தவர்கள் பெண் தெய்வ வழிபாட்டு நடைமுறையைச் சார்ந்தவர்கள். ஆண் தெய்வ வழிபாட்டு முறை மட்டும் இருந்தால் கோவில்களின் முக்கியத்துவம் குறைந்துவிடும் என்பதால் அனைத்து கோவில்களின் பக்கவாட்டிலும் பிற்காலத்தில் பெண் தெய்வங்களுக்கான கோயில்கள் வடிவமைக்கப்பட்டன. இந்தச் செயல் வரலாற்றுக்கு மிகமுக்கிய சான்றாக அமைந்துள்ளது,

தமிழகத்தில் பெரும்பாலான கோவில்களில் நீங்கள் உற்று நோக்கிப் பார்த்தால் பெண் தெய்வங்களின் பெயர்கள்தான் முன் நிலையில் அமைந்திருக்கும். அதற்குப் பின்புதான் ஆண் தெய்வங்களின் பெயர் காணப்படும் இந்த நடைமுறையில் இருந்து பெண் கடவுளைத்தான் முன்னிலைப்படுத்தி வந்துள்ள தகவல் நமக்கு தெரிய வருகின்றது. இதைப் போன்ற செய்திகள் அனைத்தையும் ஆய்வுகளின் அடிப்படையில்தான் வெளிக்கொணர முடிகிறது. அவ்வகையில் ஆய்வுகளை அறிவியல் பூர்வமாக பரந்தப்பட்ட பார்வையில் பார்ப்பதே மிகச் சிறந்த ஒரு நுட்பமாகும். அதே போன்று தமிழகப் பகுதியில் செய்யப்படுகின்ற அகழ்வாராய்ச்சி அனைத்தும் ஒரு சிறிய அகழ்வாராய்ச்சியாகவே



நாம் நடத்திக் கொண்டு வருகிறோம். அது மட்டுமல்லாமல் அந்த அகழ்வாராய்ச்சிகள் அனைத்தும் ஒரே பார்வையில் பார்க்கப்படுவதில்லை. ஒவ்வொரு அகழ்வாராய்ச்சியும் ஒவ்வொரு காலகட்டத்தைச் சார்ந்ததாக மட்டும்தான் பார்க்கின்றோம். அந்தப் பார்வையை மாற்றி அமைக்க வேண்டும் எல்லா அகழ்வாராய்ச்சிகளையும் பெரிய அளவில் நடத்தி அந்த அகழ்வாராய்ச்சிகளின் மூலம் காணப்படும் தொல்பொருட்களை அனைத்தையும் ஒற்றுமைப்படுத்தி பரந்துபட்ட பார்வையுடன் அகழாய்வு முடிவுகளை வெளியிட வேண்டும். தமிழகத்தில் உறையூர், கொற்கை, காவேரிப்பம்பட்டினம், அரிக்கமேடு மற்றும் காஞ்சிபுரம் போன்ற பகுதிகளில் அகழாய்வுகளைத் தமிழக அரசின் தொல்லியல்துறையும் இந்திய தொல்பொருள் ஆய்வுத்துறையும் நடத்தியுள்ளனர். ஆனால் இந்த ஆய்வு அறிக்கைகள் அனைத்தும் தனிப்பட்ட பார்வையில் மட்டுமே வெளியிட்டுள்ளனர். அவைகள் அனைத்தையும் ஒன்று சேர்த்து அகழ்வாராய்ச்சியில் கிடைக்கின்ற தொல்பொருட்களையும் கட்டிட அமைப்புகளையும் வைத்து அவைகளை ஒன்றுபடுத்தி ஒப்பீடு செய்து பார்ப்பதே மிகச் சரியான ஆய்வு அணுகுமுறை ஆகும். அந்த வகையில் நம்முடைய தொல்லெச்சங்களுக்கும் சிந்துசமவெளிப் பகுதியில் கிடைக்கப்பெறும் பொருட்களுக்கும் உள்ள தொடர்பினை ஒப்பீடு செய்து ஆராய்வது மிகச் சிறந்த ஆய்வு முடிவுகளை அளிக்கும். சிந்து சமவெளிப் பகுதிகளில் அக்காலகட்டத்தில் மக்கள் செம்புப் பொருட்களை அதிக அளவில் பயன்படுத்தி உள்ளார்கள். இரும்புப் பொருட்களை சிந்து சமவெளி மக்கள் அறிந்திருக்கவில்லை, ஆனால் ஏறக்குறைய அதே காலகட்டத்தில் தான் நமக்கு தமிழகப் பகுதிகளில் இரும்புப் பொருட்கள் பயன்படுத்திய செய்திகள் அகழ்வாராய்ச்சிகளின் மூலம் கிடைத்து வருகின்றன. வட இந்தியப் பகுதிகளின் செம்பு காலமும் தென்னிந்திய பகுதிகளின் இரும்பு காலமும் ஒரே காலகட்டத்தைச் சார்ந்தவையே. சிறிய காலவேறுபாடுகள் இருப்பதற்கான சாத்தியக் கூறுகள் உள்ளன. ஆனால் அங்கே கிடைக்கப்படுகின்ற மூலப்பொருட்களை வைத்துதான் அவர்களின் உலோகப் பயன்பாட்டு நிலை நமக்கு தெரிய வருகின்றது. இதை மயிலாடும்பாறை, தெலுங்கனூர், மேல்சிறுவலூர் போன்ற இடங்களில் நடக்கும் அகழாய்வுகள் நமக்கு உணர்த்துகின்றன.

உலோகத்தின் பயன்பாட்டை வைத்து இது வேறுகாலம் அது வேறுகாலம் என்பது முறையானதல்ல. அந்த அந்த காலக்கட்டத்தில் கிடைத்த உலோகப் பொருட்களை அந்த அந்தப் பகுதிகளில் வாழ்ந்த மக்கள் பயன்படுத்தினார்கள் என்பதை உணர வேண்டும். கீழடி போன்ற ஒரு பரந்துபட்ட அகழாய்வு என்பது ஒரு மக்களின் வாழ்விடப் பகுதியைப் பற்றிய ஆய்வாக அமைகின்றது, கீழடி நாகரிகம் என்பது சுமார் 1100 ஆண்டு காலம் வரை அதாவது கி.மு 800 முதல் கி.பி 300 வரை இந்த பகுதியில் மக்கள் ஒரே இடத்தில் வாழ்ந்த தொடர் நாகரிக கலாச்சாரத்தை கொண்டுள்ளதாக பார்க்கப்படுகிறது. இந்த ஆய்வு முடிவுகள் நமக்கு தமிழகத்தின் இரண்டாம் கட்ட நகர நாகரிகத்தின் தொடர்ச்சியாகக் கிடைக்கின்றன. தமிழகத்தில் கொற்கைப் பகுதிகள்தான் முதன் முதலில் கார்பன் டேட்டிங் செய்யப்பட்ட இடமாகும். அந்தக் காலம் கி.மு. 785ஆம் ஆண்டைச் சேர்ந்தது என்று கணிக்கப்பட்டது. இது ஒரு துறைமுகநகரமாக இருந்திருக்க கூடும் என்றும் ஆராய்ச்சியின் முடிவுகள் வெளியிடப்பட்டன. அதே போன்று ஆதிச்சநல்லூர் மயிலாடும்பாறை, சிவகளை, கொடுமணல், பொருந்தல், சாணூர் போன்ற பெருங்கற்காலத்தைச் சார்ந்த புதைவிடப் (Burial Site) பகுதிகளை தமிழகத்தில் கண்டறிந்து அகழாய்வுகள் மேற்கொள்ளப்பட்டன. இந்த ஆய்வில் இரும்பு பயன்பாட்டின்

தன்மை நன்கு விளங்கியது. எஃகை உருவாக்கியவர்கள் தென்னிந்திய மக்களே என்ற கருத்து அகழாய்வுகளின் அடிப்படையில் கிடைக்கின்ற மிகப்பெரிய சான்றாகும்.

கீழடி போன்ற பரந்துபட்ட அகழ்வாராய்ச்சித் தளங்களை ஆய்வு செய்து ஆய்வுகளின் முடிவுகளை விரிந்த பார்வையில் வெளியிடுவதன் மூலம் சிறந்த அறிவியல் பூர்வமான ஆய்வாக அமைய வழிவகை செய்ய முடியும்.

ரோமிலா தாப்பர் போன்ற வரலாற்று அறிஞர்கள் தமிழக வரலாற்றை இலக்கியங்களின் அடிப்படையாகக் கொண்டு எழுதுவதை விடுத்து தொல்லியல் அடிப்படையில் எழுதினால் ஆதாரபூர்வமாகவும், அறிவியல் ரீதியான வரலாறாகவும் இருக்கக் கூடும் எனவும் அவை இன்றைய காலகட்டத்தினருக்கு மட்டுமல்லாமல் வருங்காலக சந்ததியினருக்கும் மிகச் சிறந்த உதாரணமாக இருக்க கூடும் என்று அறிவுறுத்தினர். எனவே வரலாறு என்பதை புனைவுகளின் மூலம் கட்டமைக்க முடியாது என்பது மிக ஆழமான கருத்தாகும். அவ்வாறு கட்டமைக்க நினைத்தால் அது நிலைபெறாது என்பதே வரலாற்று உண்மையாகும்.

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Pleonastic Compounding, Cults and Dynastic Titles: A Few Clues to the Indus Script

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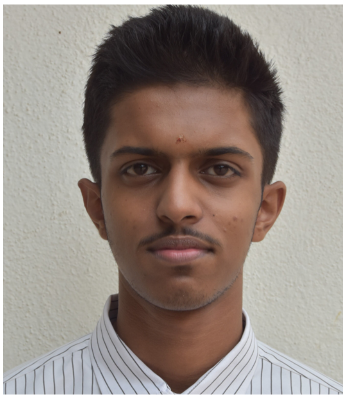


Building upon the Indus 'Script' leads of Iravatham Mahadevan and Asko Parpola, this paper presents several internally coherent hypotheses regarding the Indus Signs, Dravidian linguistic phenomena, and historical Tamil dynasties. The connections between Old Tamil and Classical Sanskrit poetic styles and the Indus Signs' potential relationships with a Dravidian language are explored, alongside tentative readings of Indus glyphs and their implications for understanding South Asian history. The iconographical and quasi-linguistic nature of the 'script' proposed by the statistical analyses by Steve Farmer, Richard Sproat and Michael Witzel is very well corroborated by the nature of the results, and is found to not wholly contradict the results built on assumptions of it being a script, by Mahadevan and Parpola.

Summary

Premise

The astronomy, theonymy, names of the various social classes relating to later Indian dynasties, and administrative and economic terms have been analysed, in the light of new evidence regarding Dravidian linguistic phenomena; several internally coherent leads, verified through reading into the Indus Sign sequences, are presented.

The term 'script' has been loosely used, since the emerging picture of the Indus glyphs is not one strictly fitting the conventional definition of a script, but rather similar to the symbol or emblem systems found in the Middle East at the same time, and the *Vinca* inscriptions of Europe, with only a quasi-linguistic element.

Further, Old Tamil and Classical Sanskrit poetic styles are shown to have a possible connection to the thesis of the Indus 'Script' correlating with terminologies, if partly and/or partially, in a Dravidian language.

Further, some toponyms and hydronyms of the Indus Valley are shown to possibly possess Dravidian reflexes, notably the ancient names of the Ghaggar-Hakra and Indus.

The focus is on providing a sound anthropological and philological basis to a possible future decipherment of the script, and engaging in discussions regarding the possible bases of the keys based on existing work.

Methodology

Firstly, the candidature of Dravidian for being a language that was spoken in the Indus Valley Civilisation has been strengthened through a systematic analysis of Dravidian formal poetry, viz., highly unmarked chains of root words, non-finite forms of verbs and strict word order, and the diffusion of this phenomenon into Indo-Aryan in the form of progressively larger compound words substituting for the older and more prevalent system of minimal compounding and maximal inflection, starting with the *Sātavāhana* inscriptions in Prakrit and later proliferating and culminating in the intensely uninflected medieval Sanskrit literature. The prestige nature of such usage has been tentatively connected to the nature of the Indus Signs and their place in the society of the Indus Valley Civilisation.

Next, the phenomenon of Pleonastic Compounding present in the Dravidian languages has been shown to bear a plausible connection with some ancestral Dravidian language having been written in a deficient ideographic set of signs, leading a probability of there having been an elite metalanguage built around these sets of signs and their secondary linguistic associations.

This has been used gainfully to gain further insights into the Tamil dynasties of *Cēra*, *Cōẓa* and *Pāṇṭiya*, the *Sātavāhana* dynasty and the various *Yādava-Vr̥ṣṇi* tribes, along with Vedic deities without Indo-European cognates bear dynastic/divine names with no clear association with royalty, and on the contrary clearly cluster around certain professions. This has not yet been explained satisfactorily, except for the case of *Pāṇṭiya*, in relation to the Vedic god *Pūṣán*, by Mahadevan. With an understanding of their etymologies, a conceptual map of the titles, demonstrated to also cluster around professions in a putative agricultural society, has been generated, and this has been further correlated to readings present in the Indus Signs.

The various results are classified with statistical analyses of co-occurrence, distribution and overlap.

Geographical and ethnic terms are also demonstrated to have possible reflexes in the Indus Signs. Furthermore, more tentative suggestions about some quasi-grammatical particles and glyphs have been made.

Results

A large number (30+) of the most common Indus glyphs have been provided with tentative readings, correlations and epithets, and these have been demonstrated to be internally coherent and largely in agreement with several proposals by Mahadevan and Parpola. The readings also explain several as-yet unexplained facets of later Indian royal names and theonyms. Their primary focus is on explaining disparate aspects of later South Asian religion, society and culture with the Indus Civilisation data providing the boundary conditions for these hypotheses.

Interesting results are borne out with regard to the history of caste in the Indian subcontinent, possibly originally as a form of political representation for different communities in an oligarchic/republic set-up, and how the way it evolves in the modern day is remarkably similar to its origins.

The primarily iconic, totemic and quasi-linguistic nature of the 'script' as statistically suggested by Farmer et al. matches remarkably well with the conclusions and the very large set of internally coherent correlations found for the symbols. The 'script' has not been 'deciphered' because it is probably not strictly speaking a script, but its ritual and cultural meanings can still be potentially analysed and extracted through linguistic methods, and that is what has been attempted.

All Indus texts are rendered right-to-left, and tentative readings are marked grey.

1. Introduction

The Indus Signs have evaded attempts at characterisation and understanding (or even certainty as to its nature, linguistic or otherwise), primarily through the intense brevity of their sequences. Preliminary leads by Mahadevan and Parpola (Parpola 1994) also indicate that it potentially primarily contains proper names accompanied by descriptives and laudatory remarks. This is highly reminiscent of later *praśasti*-s in the Deccan and throughout South-Asia, starting with the *Sātavāhana*-s. (Ollet 2017, 55)

Furthermore, the *Sātavāhana praśasti* style of minimal grammatical marking and large compounds is alien to Vedic Sanskrit and Indo-European languages in general, while highly similar to the very minimally marked, elaborately descriptive elite Sangam poetry. (Wilden 2018) Furthermore, the matronymics of the *Sātavāhana*-s and their Dravidian dynastic names might indicate that the style of writing, despite being Indo-Aryan in form, might have a Dravidian substratum in structure. (Mohan 2021) This style is later adopted extensively in Classical Sanskrit. It is a style that seems quite similar to the potential nature of the Indus signs and the Old Tamil literary style, with minimal marking and finite verbs, and extensive chaining of morphemes, further strengthening a Dravidian candidature for the putative language of the Indus Script. The discovery of a hyper-conserved word, with a vast spread of reflexes but Dravidian roots, also strengthens it. (Ansumali Mukhopadhyay 2021)

Mahadevan has pursued a lead wherein the dynastic names of the *Pāṇṭiya*-s have been shown to have Vedic parallels and to be reflexes of the titles of a community in the IVC, represented in seals frequently. Independent of the Indus signs, the dynastic titles of the *Pāṇṭiya*-s are indeed intriguingly non-regal and clustered around the descriptions of a trading and martial community. (Mahadevan 2014)

The statistical, structural and comparative analysis by Farmer, Sproat and Witzel (2004, pp 19-57) is vital to emphasise the primarily totemic, iconic and non-phonetic nature of the Indus script, and greatly aids in determining the methodology of understanding and unravelling its nature and usage. Though this paper has started with the assumption that the Indus Symbols are indeed a

‘script’, complete or partial, the results, if valid, are undeniable proof that they were not so, in the sense that not every possible sentence in whatever language it represents can be written using the symbols, and that they are instead religio-cultural symbolisms that utilise phonetic parallels to expand their semantic range.

Similarly, the other old Tamil dynasties are also found to have as-yet unexplained idiosyncratically semantically clustered dynastic titles, which will be explored in this paper.

Further, Parpola’s leads on the religion of the Indus people, especially the concepts of the primordial antitheses of the Earth-panther and the sky-bull, the youthful red deity and the old black deity, the names of the planets and stars, beliefs surrounding the fish-stars and crab-planets etc., have been extensively used and demonstrated to have Indus Sign reflexes. (Parpola 2015)

‘The Interactive Concordance of Indus Texts’ (ICIT) (Wells 2006) and ‘The Indus Script’ by Mahadevan (M-77) (Mahadevan 1977) have been used as primary sources for the Indus corpus.

The ‘NFM Indus Script’ font has been utilised to display the Indus glyphs.

The meanings of the words are sourced from Dravidian Etymological Dictionary Revised (DEDR) (Burrow and Emeneau 1984); related meanings through their Indo-Aryan cognates and calques found through the Comparative Dictionary of Indo-Aryan Languages (CDIAL) (Turner 1962-1966) and Monier Williams Sanskrit Dictionary (Monier-Williams 1899); Tamil dictionaries (DSAL UChicago), and a study of Indian mythology and sociology. The reconstructions are provided from DEDR and Krishnamurthy. (Krishnamurthy 1960)

2. Pleonastic Compounding, Lexical Degeneracy and Polysemy

Pleonastic compounding is an intriguing Dravidian linguistic phenomenon (Chandrasekaran 2011), wherein words with similar meaning are compounded to yield a compound word of the same meaning. The Indus Script lacks an adequate number of symbols to be a complete logographic/ ideographic script. This deficiency can be potentially partially remedied through compounding of symbols, analogous to how Mandarin Chinese has more polysyllabic words due to degeneracy in phonetic distinctions between morphemes.

For instance, Dravidian word roots (verbal or nominal) are often highly polysemic when shorn of their suffixes, and the suffixes are often language-specific and thus appear secondary in the earliest stages of the language family. These meanings can be potentially *clarified* by pairing with another morpheme with an overlapping semantic space, whose intersection delineates the meaning of the compound. **waẓ-(i) taṭ-* meaning ‘path’, is made of components which also mean ‘live’ and ‘block’ besides their common meaning of ‘path’; **wāy kāl/*kāl wāy* ‘canal’ made of components meaning ‘mouth’ and ‘leg’ respectively besides the common meaning of ‘canal’; **kal-(i) yā-(ṇar)* ‘auspicious’, of components with meanings ranging in **kal-(i):* ‘stone’/ ‘learn’/ ‘warrior’ and **yā-(ṇar)*: ‘tie’/ ‘fragrance’/ ‘rope’, besides the common meaning of ‘auspiciousness’; **ūm- kuñc-(i)* ‘owl’ etc. It is apparent that this linguistic phenomenon is linked to Dravidian having a number of synonyms for the same concepts, and a large semantic sphere for root syllables.

These examples may be similarly multiplied to demonstrate the function of this compounding phenomenon as one of the means (besides suffixal derivation, which seems mostly unrepresented in the Indus Signs as analysed by Iravatham Mahadevan) of narrowing polysemic ambiguity. This phenomenon thus may be very useful in a potential understanding of the concepts represented in the Indus Signs, if they indeed were utilised by speakers of some early Dravidian language. Thus, the phenomenon of pleonastic compounding in Dravidian languages (found even more commonly in the literary and archaic versions of the languages) can be tentatively linked to the elites of a Dravidian-speaking culture having utilised such symbols frequently for ritual and elite purposes in the past.

3. Tamil Dynastic Titles and Regnal Names

It is observed that the *Caṅkam* period dynasties have idiosyncratic titles with specific, surprising, non-regal semantic spheres, and building upon Mahadevan's work associating some of them with Indus Civilisation origins, parallel explanations for the other chieftaincies have been explored with a similar methodology. Sometimes, the same glyph has been distributed with multiple groups. This has been explored later. By studying the dynastic names of the various early Tamil chieftaincies, and looking into the Indus corpus for clustering groups of Indus glyphs analogous to the titles, several promising leads are found. Each glyph is provided with the ICIT ID (M-77 ID can be found therefrom; all glyph sequences displayed exist in the ICIT, frequency has been alluded to but not indicated, nor have the ID of the texts). Each Proto-Dravidian reconstruction is provided with the respective DEDR ID.

It must be noted that the ICIT collapses signs which are discrete and with separate meaning, in the corpus, notably the numeral signs (whose location, centred versus top of graphic field, has semantic meaning) and the fish with slanted as opposed through a horizontal slash through it. The ICIT IDs therefore would be similar even though the glyphs are different and are displayed as such in this paper.

3.1. Pāṇṭiya

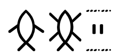
Associated with the *Maṟavar* of the Sangam period. Along with royal titles, indicates bartering and warrior professions.

[Mostly dealt with by Iravatham Mahadevan] All the symbols below cluster together.

The following is a summary of Mahadevan's readings, with some additions: (Mahadevan 2014)

Indus Glyph	Proto- Dravidian Reconstruction	Meaning and Reasoning
 255	*ma(H)ṟ-(i) 4834/4764 *kuṭumi	sheep, goat, antelope; Māṟaṉ; Jaṭāvarman, Mutukuṭumi; barter; Ajā́śva, Ágohya (epithets of Pūṣán); Kapardín
 435/436	*koḷ(ḷi/tt-) 2151 *ceṇṭ- *ceṭ-il 2761/2759 *ceẓ-i 2789	receiver, trader; Ā́ghṛ̥ṇi (epithet of Pūṣán), Koḷḷi; Áṣṭrā (epithet of Pūṣán), goad; Ceẓiyaṉ
 690/692	*wa(H)ẓ-(i/ti) 5292/5297/5372 *ampal-(i/am) 173/174 *paHẓ-i 4112 *paHṇṭ-i *kuHṭ- 1882	Karambhā́d, Vidátha, Patháspáti (epithets of Pūṣán); PIE *péh$_2$-usōn 'protector'> Pūṣán, reinterpreted as 'prosper-er'; Vaẓuti; Pāṇṭi; Kūṭal (Madurai)

Some more associations 140 warrior	*maṟa 4763 *cūṟay 2744/2743 *maḷḷa *kuṇil-ṉṟ 1684 *caṇṭ-(ay) 2318 *por- 4540	Maṟavar; Madra-s; Śūdra-s (raider/pillager; Συδροι fought by Alexander); Malla-s; Kuṇinda-s; Aniruddha (Vṛ̥ṣṇi Hero) Caṇḍāla-s Porunaṉ

 868 wall of fort city divided in unequal halves	*matil 4692 *koHṭ- 2207 *aru-ppam 229	Matiṟai; Mathurā; Araiyam in the Sangam poems (Mahadevan 2009)
or  219 or 220-240-002 paired fish or '2 carp fish'	*iṇ-ay kay-al 457 1252	Iṇai Kayal (the Pāṇṭiya Flag, paired carps or red fish, whose red scales were analogised to blood)

3.2. Cōẓa

The dynastic titles suggest an agrarian community. Possibly, given associations with being the 'new dynasty' and the white agricultural god of the Vr̥ṣṇi-s, along with the pejorative associations, the community that brought agriculture from West Asia. (Bamshad et al. 2001)

The titles/epithets dealt with include: *Cempiyaṉ, Pulaiya, Vaḷavaṉ, Kiḷḷi, Nalaṅkiḷḷi, Naṟkiḷḷi, Cēṭceṉṉi, Kiẓavaṉ, Cōẓa, Ceṉṉi, Vēḷir, Vēḷāḷar, Pāyum Puli.*

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 350	*kaḷ- 1373/1374/1372 *camp- 2347 (Bhaskar and Mahadevan 2017, 359-376) *pul-ac-/*pul-i-ṉr 4300/4303/4307	Cempiyaṉ (from *camp-i-aṉṟ); Kaḷḷar, homophonous for toddy; Aśmaka (through conflation); Kṣudraka; Mūlaka; Kīkaṭas (*kīẓ-kaṇṭ- 'eastern men'); Pulaiya-s, Pulkaśa-s; Pulinda ('creditors' (*pul-ay-p-) as opposed to the Kadambas), cultivators, labourers

 740-760 *waḷ-am derived from paired symbols of *wiḷ-ay (harvest) (Mahadevan 2007)	*waḷ(-am)-aṉṟ 5304	Vaḷavaṉ (cultivator)
 290/201/292/293/294/ 295/296/297/298/299/ 300/301/302/303/304/ 305/306/307/308-845 (replaced by related) (explained in Section 3.4) a stick-figure human hunched over, hands reaching down	*nal(-aM) kiḻḷ-i 3611/3610 4781	Kiḻḷi (harvester); Nalaṅkiḻḷi /Naṟkiḻḷi (the good harvester)
 400 plough, abundance	*koẓu/*keẓ(i)/*keṭ- 2789/2759/1579/ 1942/2147/2148/ 2149/2052/2144 *ñāṅkil 2907	Cēṭceṉṉi; Kiẓavaṉ, Kaiṭabha, Keṭṭavaṉ Saṅkarṣaṇa, Rāma (Vrishni hero); Lāṅgala Takṣaka
 952 duck, pond	*aṉṟ-il 331/3067	cakravāka; *(t)-aṉṟi (father); Janaka (Parpola 2015, 303 (agricultural/king; cf. *cati);
 374 symbol for sorghum/cereal	*cupaḷ/*cupaẓ 2896/626/1775	Cōẓa
 504 peak of mountain	*keṉṉi 1989	Ceṉṉi

277/278	*tāẓ 3178/3180 *īẓa- 540	Below, lowlands, palm-tree lands, fan palm, palm-wine (Parpola 2015, 158); Īẓava-s (toddy-tappers)
|| 032 interval *weḷ-i (cf. Asko Parpola; objection by Mahadevan not firm since it has both the senses of outer space *and* interval, throughout the family. Furthermore, the word *wāl *and* its sense of both white *and* elongated is also a valid source for the same meaning) (Parpola 2015)	*weHḷ-5496/5498/ 5507/5528/5544/ 5545 *wāl 5364/5365	Vēḷir, Vēḷāḷar, (Tambipillai 1908, 1–38) agriculturalists, priests, landlords; (Bamshad et al. 2001) Vemaki-s (white man, priest); Arjunāyana-s
350-600 symbol for embankment and grass	*pā(-m(p)p/y)(-M) pul(-i) 4085/4086/4087 4300/4303/4307	Pāyum Puli (the Cōẓa Flag, leaping tiger; pictographically homologous to embanked fields)

3.3. Cēra

The dynastic names suggest a granary-accountant community in the Indus Valley.

The titles/epithets dealt with include: *Cēral, Ūtiyañcēral, Vāṉavarampaṉ, Imaiyavarampaṉ, Ceṅkuṭṭuvaṉ, Irumpoṟai, Kuḍakkō, Ātaṉ, Pūẓi, Kaṭalpiṟakōṭṭiya-, Vāṅku-Vil.*

Fig. 1: Semecarpus anacardium seeds (Purdue University, Famine Foods)

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 817 the marking-nut *Semecarpus anacardium*, traditionally used by washermen to mark clothes, and for accounting (Bhattarai et al. 2021) 240 read by Parpola as 'carp', whose Dravidian name reads 'red-fish' (Parpola 2015, 278)	*kēr(-al) 2005 *kēr-i 2007 *kē-wal 2818 *kē-y 1931	Cēra; Neṭuñcēral Kērala; accounts; refuge, to join, town/hamlet fowl the Red God

The word *Cēra* is more frequently found in names and titles as *Cēra*l, and in the DEDR, the word seems to mean *Semecarpus anacardium*. Further, this plant's seed seems to have been commonly used for accounting and marking in the ancient period (see citation above). The visual similarity of the glyph to the seed is striking, and the next entry gives more confidence in the reading.

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 817-390 the previous, with the symbol for *wiḷ-ay/ūA (harvest/wage) (Mahadevan 2007)	*ūti(-aM) kēral	Ūtiyañcēral (marking the produce, and wage)
 904-234 symbol for *wāṉ along with a symbol indicating 'boundary' (Mahadevan 2007)	*wāṉ(-aM) war-amp- 5381 5261	Vāṉavarampaṉ (person on the boundary of the temple, associated with priests and royalty); Pradyumna (Vṛṣṇi hero, sky-conqueror)

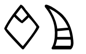
Above is tentative as there is only a single occurrence, but plausible given the next reading:

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
904-240 symbol for *cim-ay along with a symbol indicating 'boundary' (Bhaskar and Mahadevan 2017, 359-376)	*cim-ay-(aM) war-amp- 2545/2544 5261	Imaiyavarampaṉ (person on the boundary of the temple, associated with priests and royalty; conqueror of the Himalayas)
704/705/706/707-240 symbol for *kēy with symbol for *kuṇṭṭ- (Mahadevan 'How did the 'great god' get a 'blue neck'? a bilingual clue to the Indus Script' n.d.)	*key(-aM) kuṇṭṭ- 1931 1828/1669	Ceṅkuṭṭuvaṉ (the red grinder; the grinder for the Red God, or alternatively, grinder of the accounted grain)
154/155/156/157	*[ciru(-M)] poṟ-ay 474 4565 *caHta/coHṟ-poṟay 2897 4565 (Mahadevan 'Meluhha and Agastya: Alpha and Omega of the Indus Script' n.d.)	Irumpoṟai (double-carrier, kavadi-bearer) Sātavāhana; Sātakarṇin (with the symbol for food resembling the ears on a head); Bharadvāja Bharatá, epithet of Agní, Rudrá, the carrier of oblations to gods

We can see that one of the titles bears a striking resemblance to the name of the Deccan dynasty of *Sātavāhana*-s. Exploring their other titles:

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 465/467/468/469/470/471/ 472/473/474 a spear/javelin with attached symbol for crop	*cim(m)u-kka 2548 *eHw- 805	Cimuka (javelin thrower) Evvi
 157-805/806-465/467/468/469/470/471/ 472/473/474 symbol of seed with symbol for *mā (explained in Section 3.4) inside (also resembling cracks on a seed)	*poḷi-māwi caHta-poṟay 4560/4562 4784 2897 4565	Puḷumāvi (crushed seed flour carrier)

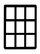
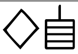
Resuming with other *Cēra* titles:

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 861-495 740-817-491 west and citadel (Bhaskar and Mahadevan 2017, 359-376)	*koṭa-kō 491/492/493/494/495 2178/2177 (only the citadel *akam) *koHṭay-kēr-aṉṟ 490/491/492/493/494/495 2005/2007 (Balakrishnan 2019)	Kuḍakkō (Lord of the citadel during loo) (Balakrishnan 2019); refuge during the Loo; Ātaṉ (Akattaṉ, lord of the Citadel); Agastya
 266/268 quail	*pūẓi 4374 (Mahadevan 2011)	Pūẓi; Pūru-s; Taittirīya-s
 798/797	*nekaẓ- 3732/3733/2923 *moc(/t)al-ay 4952/4950 (Parpola 2011, 1-57)	Makara, Nakra, Śiśumāra (sacrifice of first child); Kaṭalōṉ; Kaṭalpiṟakōṭṭiya Ceṅkuṭṭuvaṉ

892-890 symbols for 'bend' and 'bow'/'arrow'	*waHṅk-wil 5335 5422 *paṇ-(i) 3888, (<NI substrate bāṇa) *paHṇ- (homophone) 5236/4068/3884/3887	Vāṅku Vil (the Cēra flag: the extended bow; homophonous for 'buy (and) sell'); Cāpa bāṇa of Pradyumna; Sthirádhanvan, Kṣipráiṣu, epithets of Rudrá; (Ṛgveda) Pāṇar/Bāṇa (Palaniappan 2021, 1031) (lute player, labourer, servant);
 630/631/632/633/634/635 teeth inside mouth to bite	*piḷ- 4194/4195/4198/4149 (Ansumali Mukhopadhyay 2021) *kañcc- 1097	elephant, youth, Gaja, big Palyāṉai Celkeẓu Kuṭṭuvaṉ

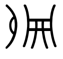
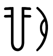
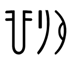
3.4. *Ōymāṉ/Atiyamāṉ*

The titles/epithets dealt with include: *Atiyamāṉ, Satiyaputa, Valaiya, Añci, Kāḷai, Pāri, Kāri, Naṉṉaṉ, Nalli, Takaṭūr, Ōy, Ōri, Eẓiṉi, Kaṭampa*.

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 615/617 boundary and net/furrow-lines	*cati(-r) 2325/2327 *walay 5288 *nāṭ- 36387	Atiyamāṉ, Satiyaputa, Valaiya-s; catirāṭṭam; Sītā (Sanskrit sī/sā to sow, draw a line, boundary) (Parpola 2015, 303)
 595/596/597 a tablet/writing material with stylus	*añ(c)c-(i/al) 55/54 *kiHr-(ukk) 5263 *takaṭ- 2995 *war-ay 5263	Añci, the terrifying one, Bhīma related to Ōy-s and Vāsudeva kīraka (scribe)
 850-595/596/597	*takaṭ- akam 2995 7	Takaṭūr

 243 black fish, with crown to indicate 'big' (Parpola 2015, 312)	*mā-(l/y) 4781/4822 *kar- 1278	Atiyamāṉ the Black God; the great one; *(glyph typically avoided due to taboo avoidance, replaced with antlers)*
 405/406/407/408 antlers of barasingha, visually similar with the glyph for *niwi(ḷ)	*mā-(ṉ) 4780/4781/4782	beast, deer; taboo avoidance homophone for *mā-(l/y) (due to association with the other fearsome, inauspicious Black God) (Parpola 2015, 312)

The 'double short-line at the top' ( ) glyph has been identified as *-iṉ (Mahadevan 'Meluhha and Agastya: Alpha and Omega of the Indus Script' n.d.). This can be explained as a derivation from the phonetic value **ciHr* 'two.' ( ) This is like the 'single vertical short-line in middle' ( ) **oh-* 'one' giving rise to the 'single vertical short-line at the top' ( ) *-*um* inclusive/ present participle marker. The 'vertical small-line in top with long hooked line' ( ) being of a similar possessive/oblique- marking nature would possibly be *-*aH*, which is made even more certain by its homophonous negative conjugation, as used below. Thus, certain grammatical markers have their identity revealed both through their structural position and phonetic rebus derivations (discussed in Section 6.3). Thus, a cluster of three related phrases can be tentatively deciphered thus:

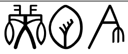
Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 920-320/318/322/323/324/325 symbol for 'bull' with two horns and legs, head on view, stylised, and eye  740-920  740-060-920 *aH possessive /negative marker in between	*kaH-(ḷ-ay)/ā- kaHṇ 1502/334 1443 *kaṇṇ-aṉr 1443 *kaHṇ-aH-aṉr 1443	Kāḷaiyar, bull-watchers, cowherds; Pāri (the seer), Kāri (the black one); Andhaka, Vṛṣṇi, Gopāla, Vahnikula (prakritisation and resanskritisation of Vrishni, also Dravidian *kaH to burn, fire)
		Homologous for 'The black one with eyes' *(Kāḷai) Kaṇṇan*, translated into Sanskrit with partial homophony and meaning-match '*Kṛṣṇa*' 'black' Thus, the Sanskrit word *Kṛṣṇa* is more likely derived from the Dravidian than the other way around, due to the obvious calque nature of the Sanskrit word *if* the reading above is valid.

 405/406/407/408-845 symbol derived from symbol for bangles, and symbol of horn of barasingha	*nal mā(l/ṉ) 3611/3613 4781 from *nal-aṅk (3610) (to bend, to be wrapped around, thread tied during fasting ceremonies)	Naṉṉaṉ; Nalli; Vasudeva (Vr̥ṣṇi hero, the Good God); blackbuck (black deer)
 700 vessel	*kaṭ-amp- (<ghaṭam Language X substrate?)	Kadamba-s (‘debtors’ (*kaṭ-aṉ) as opposed to Pulinda/Pulaiya)
 231	*coH-y/*coH-mp 1033/1056/1057 (Parpola 2015) *eẓ-(il-i) 851/848/849/853 *eḷu, *oḷi 857 *mār-i/*mā-ka 4818/4819/4781	Ōy; Eẓiṉi; Ōri; Śrīvatsa, Rakṣás (mark in chest making it similar to bear, OIA word ṛ́kṣa), Sītā, Lakṣmī, Lakṣmaṇa, Māri, Karuppaṉ, Nārāyaṇá

3.5. *Āy/Āvi*

As identified by Asko Parpola. The initial **c-* in PD, when reconstructed, provides a wealth of cognates with intriguing relationships.

Indus Glyph	**Proto-Dravidian Reconstruction**	**Meaning and Reasoning**
 233 descending star (fish with a slanting line)	*caH(w)(i)y	Āy (goat-herd, herder); Ābhīra (from plural); Sāmba; Sākya; Yakṣa; (Samuel 2008) Śāstā (word for Buddha or Jina in the South) (Levman 2014, 145– 180)
 176/177/178/179 porcupine	*cey-(t/m-) 2776/808/805	Eyiṉar (lance fighters, also means ‘good’ by homophony)
 151	*poṟay 4565 *kōc- 2192	a carrier, peon, Kosala, Kōcar

 154/155/156/157	*[ciru(-M)] poṟ-ay 474 4565 *caHta/coHṟ-poṟay 2897 4565 (Mahadevan 'Meluhha and Agastya: Alpha and Omega of the Indus Script' n.d.)	Irumpoṟai (double-carrier, kavadi-bearer) Sātavāhana; Sātakarṇin (with the symbol for food resembling the ears on a head); Bharadvāja Bharatá, epithet of Agní, Rudrá, the carrier of oblations to gods
 157-805/806-465/467/468/469/470/471/ 472/473/474 symbol of seed with symbol for *mā inside (also resembling cracks on a seed)	*poḷi-māwi caHta-poṟay 4560/4562 4784 2897 4565	Puḷumāvi (crushed seed flour carrier)
 465/467/468/469/470/471/ 472/473/474 a spear/javelin with attached symbol for crop	*cim(m)u-kka 2548 *eHw- 805	Cimuka (javelin thrower) Evvi
 159/161	*cey- poṟay 808/805 4565	lance carrier

3.6. Toṇṭaimāṉ

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
or 136 or 130 person with plough	*toẓ- 3524 (Mahadevan 2007) *uẓay 680 *toṇṭ- 3525 *viṉ-ay- 5445	Pallava-s, Toṇṭaimāṉ (slave, devotee) Śramaṇa Vināyaka-s

4. Pervasive and Interconnected Myths

1. The Youthful Divinity of auspiciousness and The Old Divinity of inauspiciousness

Refer to Parpola, *Roots of Hinduism* (2015, pp. 199). Also, the contrast between *Gaurī* and *Kālī*, *Śiva* and *Kāla*.

It seems to be a myth native to South Asia.

2. Earth panther and Sky bull

Refer to Parpola, *Roots of Hinduism* (2015, Chapter 19, pp. 236 onwards).

Clearly a myth imported from the Middle East, might be associated with the Iranian agriculturalists who brought wheat agriculture to the Indus valley, Mehrgarh and the Helmand culture.

3. The elephant and the crocodile

The crocodile's importance in Indian Mythology has already been explored, (Parpola 2011, 1-57) but this is not to be seen in isolation. The myths of *Gajendramokṣa* and *Naṭarāja-Apasmāra/Muyalakaṉ* indicate that the myth was meant to be a mythical pairing between the large majestic elephant that walked into waters and the creeping, hidden, dangerous predatory crocodile. Further, as both animals were symbols of the related *Pradyumna-Rudrá-Kapila- Śiva* complex of deities, it probably is a myth originating from the people who worshipped that complex natively. (Refer to Section 5, *Pradyumna*) Further, through *Rāhú* and *Ketú*, we find that this myth and the next, as well as the thirteenth, are closely related.

4. Fort builders and fort destroyers; Water-holders and their destroyers

Dāsa Śambara and *Índra*, *Purandara*, *Vṛtrá* and *Índra*, *Śiva* and *Gaṅgā*, *Śiva* and *Tripurāsura*-s, *Murukaṉ* and *Śūrapadma/Tāraka/Krauñca* etc. Myths seem to center in the northwest-South Asia and Afghanistan region.

5. Conflict between oligarchic law-breaking and monarchical law-abiding heroes

The myth of *Kaṁsa* usurping power in an oligarchy and *Kṛṣṇa* recovering it, and the vaguely analogous but antithetical story of *Rāma* and *Rāvaṇa*. Further, the festival celebrating the return of the banished monarch, both *Dīpāvalī* for *Rāma* and *Ōṇam/Dīpāvalī*! (*Balipratipadā*) for Bali.

6. Contrast between 'debtor' cultivating community and 'creditor' landowning community

The pairing of *Kadamba-Pulkaśa* and *Kaṭampar-Pulampar* with the Dravidian roots having meanings of 'debtor' and 'creditor' with communities who were landowning and cultivating respectively. (DEDR)

7. Islands, sinking cities and land claimed from the sea

Dvārakā, Pūmpukār, Samudra Manthana (in the Ocean of Milk, which has been tentatively linked to the Rann of Kutch later in this paper, and thus this is also situated in a similar geography as the other legends), *Paraśurāmakṣetra*, *Kaṭalpiṟakōṭṭiya*, bridge to *Laṅkā*, *Kāyal*-s of Kerala, etc. Further, just as *Laṅkā* was built by *Kubera* but ruled by *Rāvaṇa*, *Dvārakā* was built by the Nāga-s

but ruled by *Kṛṣṇa* (similar to Ocean churned by *Asura*-s too, but the treasures claimed only by the *Deva*-s). Also linked to the various forts/cities named *Katavam* and *Potiyil* in the *Caṅkam* period. This is also linked, possibly, to the mare in the sea and submarine fire (*Vaḍavānala*). (Parpola 2015)

8. Sóma and the moon, Cannabis and other drugs

Refer to Sarianidi, V. Margiana and *Soma-Haoma* (2003) and Parpola, 2015. Further, *Śiva* being intoxicated by *Cannabis*, and Balarāma's consumption of *Tāla* liquor or toddy, and the Vedic people importing *Sóma* from the people from the Hindu-Kush (and *Vāsudeva* being described as *Saumya* or drunk on *Sóma*).

9. Sacred trees as seats of power of deities

The Gonds believing that *Persa Pen*'s power resides in the *Terminalia elliptica* tree (*Marutam* in Tamil, of *Vēntaṉ*) (Mehta 2016), the various *Vṛṣṇi* heroes with their respective trees of power, *Kadamba* of *Kṛṣṇa* etc.

***10. Uttarāyaṇa, Dakṣiṇāyana,* yearly cycles and different systems of agriculture**

Refer to Witzel, *Roots of Hinduism* (2015, pp. 249).

11. The triple city and its destruction

Tripurāntaka, *Trikūṭa* also refer *Kṛṣṇayajurveda Taittirīya Saṁhitā* 6.2.3.1, and Mahadevan, 2009 for Sangam sources.

Further, the three cities were golden, silver and 'metal', which aligns very well with the primal and more important subset of the *Vṛṣṇi* heroes, *Saṁkarṣaṇa-Ekānaṁśā-Vāsudeva* who are depicted as white, golden and black respectively. Another subset, the binary of *Nara- Nārāyaṇa*, and the word *Kṛṣṇa-Piṅgala* (black and red) used to describe divinity, seems to be a further subset of these.

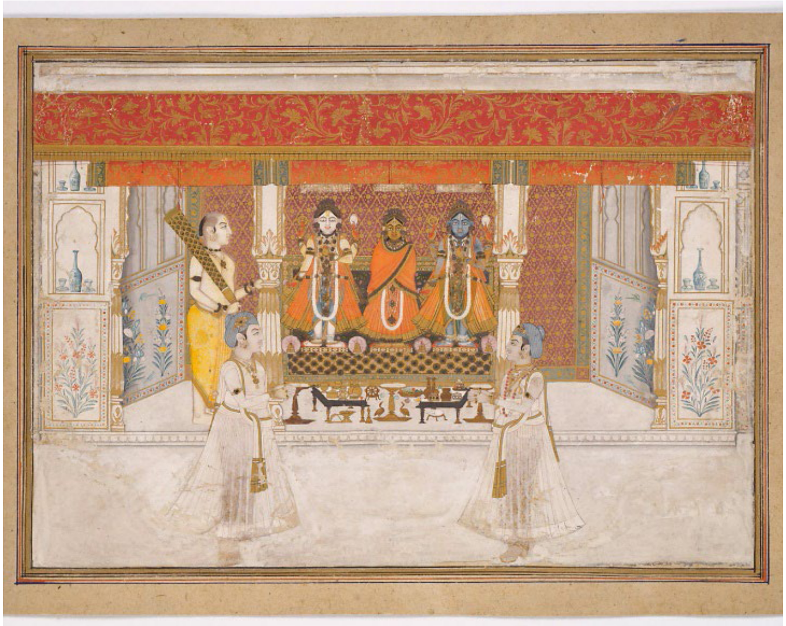


Fig. 2: Saṁkarṣaṇa-Ekānaṁśā-Vāsudeva

12. The Three *Caṅkam-s:*

Refer to Zvelebil, K., *Smile of Murugan* (1973, Chapter 4). Also linked to the legend of the three cities as well as sinking cities.

13. Humanoid and non-humanoid mythical creatures

The *gandharva-s, yakṣa*-s, *nāga*-s, *kinnara*-s, *rakṣás*-s, *vānara*-s etc. probably represent various ethnic groups, or the respective deities they worshipped. This appears even more likely when the fact that these various groups are used by castes/tribes in South Asia, and they also possess specific geographical associations in the myths. The non-humanoid mythical creatures, like *Śarabha*, *Gaṇḍabheruṇḍa* etc., don't represent the various peoples in the same way.

14. The solar deity that lifts (the mountain) and the storm deity that crushes (the mountain)

Rāvaṇa and *Śiva*, *Kṛṣṇa* and Indra, Kūrma and *Śiva*, *Karṇa* and *Arjuna*

15. Rich Oceanic Deity and Austere Montane Deity

Lakṣmī born of the ocean and *Pārvatī* born of the mountains; *Viṣṇu* with elaborate ornaments living in the ocean and *Śiva* the mendicant living in the mountains.

16. Śarabha* and *Gaṇḍabheruṇḍa

Related to the mythical fights between *Garuḍa* and Nāga-s, and Sūrya and Rāhu. Probably originated from the BMAC. (Parpola 2015)

Fig. 3: Axe with eagle-headed demon & animals; late 3rd millennium-early 2nd millennium BC; BMAC; gilt silver; length: 15 cm; Metropolitan Museum of Art (New York City)

17. Sacred quintuplets (dealt with further in the next section)

Vṛṣṇi heroes, *Pāṇḍava*-s, *Pañcāyatana Pūjā* in every Hindu sect where no one deity is solely worshipped no matter what sect a person belongs to (a form of enforced polytheism and attempt to avoid monotheism) (Reitze 1998) (Reitze 2005, 105-112), *Vaikuṇṭha Caturmūrti, Sadāśiva, Páñca Jánāḥ,* Old Tamil gods, *Vásu-Ādityá-Rudrá-Aśvín*-s, the five planets (Parpola 2015) (excluding Sun and Moon (which are, in Hindu mythology, duplicates/close- relatives of Saturn and Mars) and the non-corporeal *Rāhú* and *Ketú* (which are duplicates of Mercury and Venus)), the five sacrificial animals (of each half of the year/of the Indo-Aryans versus the natives), five elements, etc. all show that a group of five divinities was of great importance in Hindu mythology. In *Taittirīya Saṁhitā* 4.3.3, there is compelling evidence of the Vedic people having adopted and adapted this classification to their religion, while having a system of five seasons correlated to directions and divinities (just like the *Caṅkam Tiṇai*-s!) as well as peoples.

Furthermore, the BMAC people having a close relationship with the Indus Valley Civilisation (IVC) and even adopting their cultural idiom of five-peoples is visible in the Avestan system of *Airiia*, *Tuiriia*, *Sairima*, *Dāha* and *Sainu* in the *Fravardin Yasht*. The Bactria-Margiana Archaeological Complex (BMAC) has extensive cultural and trade links with the IVC, and further, similar to the IVC, never adopted a script in spite of trading with the literate civilisations of Mesopotamia. (Farmer, Sproat, and Witzel 2004, 19-57) Further, the distinction between the bow-wielding Scythians and the spear-wielding Sarmatians and *Saka*s is reflected in the Indus glyph reflexes for those people.

5. *Pañcāyatana, Vṛṣṇi* Heroes, *Tiṇai-s and Pāṇḍava-s*

The group of five *Vṛṣṇi* heroes are some of the earliest divinities found in the archaeological record of Northwestern South Asia. They later survived into the *Pañcarātra* Vaishnavite system without *Sāmba*, who by then had become evil/disruptive in the stories, and was shorn of divinity. Regardless, from the earliest times, *Sāmba* had an amorphous, undefined character and was often missing from the list of heroes.

> "The four-faced Viṣṇu image lucidly illustrates textual prescriptions for a properly formulated caturvyuha icon as described in an important three-volume seventh- or eighth-century *Pañcarātra* text, the *Viṣṇudharmottara Purāṇa*, believed to have been composed in Kashmir. This visualization of the *caturvyūha* system, and one prevalent in Kashmiri im- ages, grants to each of the *vyūha* emanations a specific mode of expression. This somewhat complicated formulation results in the following equation: the east or central (Vasudeva) face is Saumya, the placid one; the south face (Saṁkarṣaṇa) is Narasimha, the man-lion; the west face (Pradyumna) is Kāpila, a fierce ascetic; the north face (Aniruddha) is Varāha, the boar. The placid, man-lion and boar faces can be seen on the front of the image, and an angry face, not visible here, is located on the back." (Atherton, C. P.,1997)

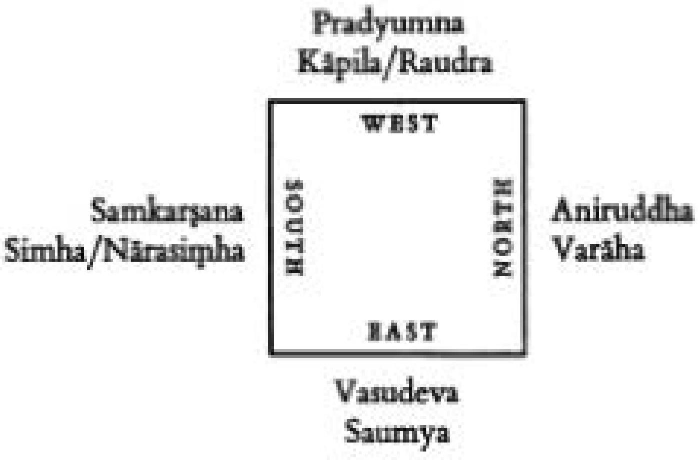


Fig. 4: Srinivasan, Doris. "Early Vaiṣṇava Imagery: Caturvyūha and Variant Forms." Archives of Asian Art 32 (1979) (pp. 41).

We may thus formulate a pattern of associations in the medieval *Pāñcarātra* system, a descendant of the cult of heroes in ancient northwestern India (where *Sāmba* has been excluded by the *Pāñcarātra* system) (Srinivasan 1979, 39–54) (Gupta 2019, 80–81) (Atherton 1997, 78) (Kamalakar and Veerender 1993, 92) (Journal of the Indian Society of Oriental Art 1937, 16):

Saṅkarsana	*lāṅgala* *musala* wine	*tāla* palm	*simha*
Vāsudeva	*cakra* *gadā* *śaṅkha*	*Garuḍa* *udumbara*	*saumya*
Pradyumna	*cāpa* *bāṇa*	*makara* *nyagrodha*	*raudra, Kāpila*
Aniruddha	*carma* *khaḍga*	*ṛṣya* *aśvattha/pippali*	*varāha*
Sāmba	?	?	?

Their characteristics are *uncannily* similar to the descriptions of the various early Tamil kingdoms whose antecedents can be identified in the Indus corpus, and there seems to be a neat correlation between the two. Not just that, the corresponding set of *Kuru* heroes of the *Kuru* kingdom, the *Pāṇḍava*-s, also seem to form a neat pattern of correlations with the same, as well as the *Kosala* heroes. Further, the five gods of the Sangam period Tamils, one corresponding to each *Tiṇai*, also match precisely, along with an uncanny similarity with the *Páñca Jánāḥ* of the *Ṛgveda* and the parallel pattern in the *Avesta*, from whose

geographical locations, we can identify the geographical distributions of these peoples in the IVC, by virtue of these being the chronologically closest.

The later legends of Pūru being the youngest but favoured son of *Yayāti* in the Mahābhārata, and *Airiia (Īrāj)* being the youngest but favoured son of *Θraetaona (Fereydūn)* in the *Shahnameh*. seem to indicate the migration of the Indo-Iranian speakers from the Steppes (*Airiianəm Vaējah*, the expanse of the *Arya*-s that was afflicted by bitter winters) and them dominating as the later peoples of BMAC and IVC. Strikingly, even in the Vedic texts, the enumeration of five is adhered to even though the distinction between the *Yádu*-s and the *Turvaśá*-s is not strong at all, similar to how *Sāmba* is elided in later Vaishnavism.

The associations and the reason for the same are listed in next page: (Parpola 2015)

Fig. 5: The so-called 'Pashupati' seal

The five animals surrounding the horned man (goat below) in the so-called 'Pashupati seal' are the totems/symbols of the five clusters identified above, with the **caH-y* or the fifth people in the bottom (goat), and the directions maintained. (*'Corpus of Indus Seals and Inscriptions'*, 1987)

These directions align perfectly with the heads of *Vaikuṇṭhacaturmūrti* form of *Viṣṇu* (without *Sāmba*; the faces agree with the discovered paradigm of directions and not the one followed by the *Pāñcarātra* system itself) and the five-headed form of *Śiva* (Pandey 2000, 1248–1262) (with west and north flipped). Based on the interconnected myths and the set of correlations found in this section, we can read further into the Indus Corpus to arrive at readings for a large set of interlinked and co-occurring glyphs with strong resonances in later Indian mythology.

6. Results

The glyph groupings provided below are not meant to imply that they are the only possible associations; rather, this is an attempt to gauge their possible semantic spheres through a combination of studying their *commonest* associations, as well relevant evidence in South Asian history, religion

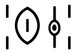
Tamil Kingdom	*Vr̥ṣṇi* hero	*Kuru* hero	Vedic tribe Avestan tribe	*Kosala* Hero	Other associations	Sangam god	Direction (from Vedic tribes)
Cōẓa	*Saṅkarsaṇa* <agriculture	*Yudhiṣṭhira* <law abiding monarch	*Druhyú* < 'harm-er' (Section 7) *Dāha* < realm of Vərəθra and *Azhi Dahāka*	*Rāmá* < agricultural god	Venus, *Ketú* < agriculture	*Vēntaṉ*	west
Ōy, Atiyamāṉ	*Vāsudeva* < 'good god'	*Bhīma* < 'fear'	*Ánu* < Dravidian for 'man' *Sainu* (?)	*Lakṣmaṇa* < 'the one with the mark'	Saturn, Sun *Viṣṇu* < 'black'	*Māyōṉ*	south
Cēra	*Pradyumna* <the powerful one/ 'reaching sky'	*Arjuna* < bow-wielder	*Pūrú* < 'quail' *Skuθa* < 'archer'	*Bharata* < from *Kekeya*, ruled *Gandhāra* 'carrier'	Mars, Moon *Śiva* < 'red'	*Cēyōṉ*	north
Pāṇṭi	*Aniruddha* < sword weapon *Ekānaṁśā* < warrior goddess, 'the partless one' symbol	*Nakula* < sword-wielder	*Turvaśá* < 'fourfold control' similar to the symbol for _*pāṇṭi_ or _*tuṟ-ay_ *Tuiriia* < 'four' or _*tuṟ-ay_	*Śatrughna* < ruled *Mathurā*, 'defeater'	Jupiter *Caṇḍī*, *Durgā* < 'war' 'fort'	*Koṟṟavai*	centre-east
Āy, Toṇṭaimāṉ	*Sāmba* < _*caH_	*Sahadeva* < _*caH_	*Yádu* < 'goat' goat herder, *Yādava*-s identified with the *Āy*-s *Sairima*, *Saka* <'spearmen', _*caH_	-	Mercury, *Rāhú* *Ayyappaṉ*, *Śāstā* <_*caH_	*Kaṭalōṉ* < *Makara* transferred from *Cēyōṉ* by the elephant-crocodile myth	east

and cultural traditions as a first step in approaching a full understanding of the Indus Signs. It is almost certain that this is *not* the only aspect of these symbols, but we can get closer to understanding their other aspects by getting an idea of at least *some* of what they might have meant through this method.

6.1. Theonyms, Ethnonyms and Astronomy

6.1.1. Archetypal Pairs

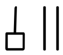
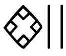
Like the demonstrated pairing between fish and quail as shown by Mahadevan,

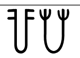
Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 945 wheel and road, with plural suffix surrounding	*aHṟ- cuHẓ- 311/405 2735 path/way, to rotate/spin *waẓi kāl 5297 1483 road, wheel	Aṟam and Ūẓ (righteousness/the way, and fate) or Dharma and Niyati, Dharmacakrapravartana
 946 symbol crop with seed (*nel), and Sun	*amu-cu nel- 168/169 3753 3754	Soma and the Moon (refer to later sections for explanation of each symbol)
 944	*miHṉ māṭ-(amp/i) 4885 4796 *nakar 3568	temple, walled city, palace, citadel with priests and priestesses; Nagara Liṅga-Yoni?

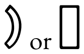
6.1.2. The *Vṛṣṇi/Yadu/Kuru* Heroes, *Páñca Jánāḥ*, *Pañcāyatana*, *Caturaṅga*, Dravidian Folk Deities

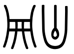
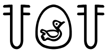
Indus Glyph	Proto-Dravidian	Meaning and Reasoning
 140-015 405/406/407/408-015	*cay-(aM) maṟa 2826 4763 *cay-(aM) mā- 2826 4780 *caHy-a 2457	The Five Warriors, Pañcavīra, Ayya (father/lord), Āy (mother goddess); The Five *mā-s (by suppletion); colours (there are five basic colours in Dravidian), Várṇa-s, the Five Peoples/Colours; Pañcāla (the five peoples, Āla < Drav. Āḷ)

6.1.2.1. **weHḷ Saṅkarṣaṇa/Yudhiṣṭhira/*cupaẓ/Druhyú/Vēntaṉ*

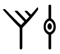
Indus Glyph	Proto-Dravidian	Meaning and Reasoning
 400	*keẓ(i)/*keṭ-/*koẓ-(u)/*koṭ-u 2789/2759/1579/ 1942/2147 /2148/2149/2052/2144 *ñāṅkil 2907	Saṅkarṣaṇa/Yudhiṣṭhira/*cupaẓ/Druhyú/Vēntaṉ, lāṅgala, Rāmá, Kuśī́(ploughshare), Nāga Takṣaka, Váruṇa, Vr̥trá, Mayāsura, Vásu-s (the nature spirits of Middle-Eastern/Indo-European mythology) Kiẓavaṉ, Kaiṭabha, Keṭṭavaṉ to winnow; fat, prosperous, young, beautiful; Śuná, of the Vedic agricultural pair Śuná-Sī́rá
 032	*weHḷ 5496/5498/5507/ 5528/5544/ 5545 *aẓ-(ak-) 274 *wāli/*wāl miHṉ 5364/5365 meaning both Venus as well as comet/meteor *aṟ-am-aṉṟ 311 *cir-aṇṭṭ-(i/a) 474	Venus, West, White, Iranian agriculturalists, Kot Diji and Mehrgarh peoples, Vēḷāḷar (agrarian caste), Vēḷāṇmai (agriculture), Vāli, Rāmá, Śukrá White God, priest, sacrifice, (divine powers attributed to Koragas); (Sequeira 2024) Ketú, the snake-tailed monster that blocks the Moon (with reference to the myth of Vr̥trá-Índra) agriculture; to desire; Brahmán (God of desire and sacrifice and incest, (connect to story of Brahmán pursuing his own daughter and bei beheaded by Rudra (**keHy*), as well as the Eastern Iranians and their practice of incest, with whom these people are geographically related (Scheidel 1996, 319-340))); (by similarity to 'two') Iraṭṭi > Reḍḍi (agrarian caste), Raṭṭa kingdom/ peoples of Maharashtra region, vassals of Sātavāhana-s, Rāṣṭrakūṭa, Raṭṭa/ Raṇḍa (Indo Aryan pejoratives for lower castes, with implications of infertility/incest probably related to the consanguineous marriage practices) (Heidari et al. 2014, 248-255)
 700-032  590-032	*weḷ- kal- 5496 1305 *weḷ- ka(H)ṯ/ẓ-(amp/ay/uk) 5496 1116/1113/1441/1362	bronze, called the 'white metal' after Tin that is essential for its production; *Anser indicus*, śvetagarut (Monier-Williams 1899), kadamba, the bird that can separate milk from water and truth from falsehood, haṁsa Upāirisaēna (Avestan), the Hindu Kush 'above which the birds cross', *Anser indicus* being the some of the highest-flying birds Vēṅkaṭam, northern mountains, Kailāsa, where these birds come from (Lanman 1898,151–158)
 850-032  877-032	*weHḷ(-i) akam/uHr 5496 7/752 *weHḷ kuHṭal/paHẓi 5496 1882/4113/4046	the white city/citadel, the silver city, Veḷḷiyampalam, pū́ḥ rajatā́ [Kr̥ṣṇayajurveda Taittirīya Saṁhitā 6.2.3.1]; the city of the sacrifice, Prayāga

 740-760 *waḷ-am/*mal derived from paired symbols of *wiḷ-ay (harvest)	*waḷ(-am)-aṉr̠ 5304 *mall-aṉr̠ 4729/4730	Vaḷavaṉ, Vaḷḷuvaṉ (cultivator) Malla, strong, Mahābali, Mahāmalla, Bala-rāma
 142	*wēl- 5368/5537 *wēẓ-amp- 5541/5543 *pē-(y/ṇ) 4438 *wē-nt- 5529/5530 *kōl 2237/2239	Vēlaṉ (priest); Vēẓampaṉ/Velambaka (jester, gymnast); Vēntaṉ, central figure of the 'Pashupati Seal' (emperor; with *key-(aM) kōl 'the Red Sceptre' / 'the Copper Sceptre'), rā́jan Váruṇa; Māvēli, Mahābali; *Vachellia nilotica;* Kodaṇḍa
 277/278 340/341/342 /343/344/ 345/346/347 /348	*tāẓ /*īẓa- 3178/3180/549 *tey-(aM)/ *tit(t)- 3268 *kaẓ-tay 1364 *marVḷ 4723 *kuti-(ray/-ar̠)/kur̠r̠-(amp) 1704/1707/1709 /1710/1711	Tāla palm, flag of Bala-rāma, gardabha, equine, turaga, the wild asses that pulled the Aśvín-s' chariot, faster than the horses of Índra; (Parpola and Janhunen 2012, 59-124) Tālajaṅgha-s; Madhu, Mādhava; Tīyaṉ, Titiyaṉ; todd various agricultural terms in Dravidian, to dig up, store grain etc.; kaẓutai on top of which newly crowned kings rode, the royal animal; (Parpola and Janhunen 2012, 59-124) (Weber 2008, 499-519) Kuti, meaning heel, and Kutirai, meaning ass (Weber 2008, 499-519)
 405/406/407 /408-061/062 to slope, to flow off, to break, to be sharp	*waṭ-(i/a) mā 946/5221/5222/5225- 1501/1502/1494	Vaḍavāmukha, Vaḍavānala, the submarine fire breathing mare, that drinks the ocean (linked by Parpola to the Indian wild ass) ; (Parpola and Janhunen 2012, 59-124) mud volcanoes of Balochistan and Sindh
Identified as the Water-Holding Snake archetype of the myth of the **keHy* by the **keHy*, who considered themselves the representatives of the Snake-Killing and Water-Releasing Hero archetype.		

 923/600	*pā(-mp) 4085/4086 *karay 1292	snake, Ādiśeṣa, Nāgá, poets, bards (kuśīlava), Nāvalar (Jambudvīpa); Vṛtrá/Áhi, Ketú, snake which held back waters, Váruṇa, Azhi Dahāka of the Avesta; Karaiyar, coastal people, ocean-salt makers
 374	*cupaḷ *cupaẓ *cuppV(l/r)(<cis-Elamite) *koral 2896/626/1775 *kōt-i/kūli 1906	sorghum, Cōẓa-s, salt, upparavar (bricklayer), úpala (stone), Mayāsura, architect, builder; Upulvan/Uppiliyappaṉ; Takṣaka, Takṣaśilā; wheat, whose cultivation was brought from the fertile crescent; Kodaṇḍa
 350	*pul(-i/amp) 4300/4303/4307 *ciṅk-(i/a) 429 *kaḷ 1373/1374/1372 *camp- 2347	tiger, Pulaiyar, Pulkaśa-s, Kaḷḷar, toddy, Kalabhra-s, Bhū, Earth-panther, poet, lion, siṁha, Mahiṣāsuramardinī; Kaḷḷaẓakar; creditor, landowner; Jambudvīpa, Kutch/Laṅkā, Nāvalam Taṇpoẓil (Paripāṭal 5-9)
 290/201/292/ 293/294/ 295/296/ 297/298/299/ 300/301/ 302/303/304/ 305/306/ 307/308	*kiḷḷ-i 1589	Kiḷḷi, Láva (sickle)
 110/111 person sitting with vessel in hand	*kaṭ-amp- amar- 1113/1116 161 *kunt-i- uṇ- 1728 600 *iru-(kk) weHḷ 480 5545	Kuntibhoja-s (sitting/squatting and eating); Kaṭampamar (description of Murugaṉ, 'sitting on the Kadamba tree'); Niṣāda-s, Niṣadha-s; Irukkuvēḷ IA word for *Terminalia elliptica*, Āsana (*marut-)

 717/718	*yaHẓ 5156 *ic-(ay/amp) 469/470	harp, music, to sound, move
 504 peak of mountain	*keṉṉi 1989	Ceṉṉi head/peak
 320/322/323/ 324/325/ 318- 704/705/ 706/707	*ku(ṇ)ṭa(M) kaH 1651/1649 1502 *ku(ṇ)ṭ- 1651	the Indus Unicorn, nilgai, auroch (western bull)emblem? of the Indus Civilisation Kaṁsa, a copper/metal pot, Cempukkōṭṭai Tuvarai; Musala, pestle, implement to process agricultural produce
 490/491/492/ 493/494/ 495	*koHṭ-(ṭay) 1649 *mar-(pp-/ay/u(n)t-/Vḷ) 4720/4725/4724/4723	west; fortress/ramparts; the horn of the unicorn, nilgai/auroch, unicorn; *Terminalia elliptica*, tree of Persa Pen of the Gonds (Mehta 2016), Marutam, medicine, doctor, to be drunk
 740-952-740	*t-aṉṟ-(aṉṟ/i) 331/3067	Taṉṟi (father); Janaka (agricultural/king; cf. *cati); cakravāka
 460-490/491/ 492/493/ 494/495 horn and awn/gin	*mar-u mak- 4720/4715 4623/4616	nephew/child, heir; matrilineal inheritance (as also evidenced by North Dravidian affinity and U1 MtDNA Haplogroups co- occurring in Koragas, showing matrilineal transmission of language) (Sequeira 2024), consanguineous marriages extensively followed in the Middle East as well as South India (especially Vēḷāḷar and Reḍḍi agrarian landholding castes) (Sharma et al. 2021, 566–76); Marumakkattāyam, Aliyasantāna

*6.1.2.2. *mā(l/y) Vāsudeva/Bhīma/*coHy/*cati/Ánu/Māyōṉ*

Indus Glyph	Proto-Dravidian	Meaning and Reasoning
	*mā(l/ṉ)	Vāsudeva/Bhīma/*coHy/*cati/Ánu/Māyōṉ Saturn, Sun, South, Black, AASI, Amri-Nal bull, cow, nilgai, sky-bull of rain, Bhadra-kālī, Rāvaṇa, Viṣṇú, Ādityá-s, Ikṣvāku (?), Nārāyaṇá, Ekapād
243 black fish, with crown to indicate 'big'	*mā-(l/y) 4781/4822 *kar-(pp/mp/aṭi/ay)-1278/1263/1262/ 1288/1287/ 1291	the Black God; the great one; to get 'high' on stimulant; black, sugarcane, Ikṣvāku, Ikṣusāgara, Gauḍá; Indian black bear, with white marking on chest; Akhara; to roar, to scream, Rāvaṇa *(glyph typically avoided due to taboo avoidance, replaced with antlers)*
Due to eastward migration of Harappan descendants, the people were later mostly Munda rather than AASI; but the BMAC-vs-AASI cline probably underlies the Lunar-vs-Solar dynasty cline in the origin of the identity and myths, even though the latter's descendants predominate in literature in predominantly **caHy* regions (cf. confusion between *Āy*-s and *Ōy*-s in Sangam literature), the Early (non-Vedic) Indo-Aryan migrations probably had a greater tendency to associate with this identity, as opposed to the Vedic Indo-Aryan association with the **keHy*. 12 51 52		
405/406/407/408 antlers of barasingha, visually similar with the glyph for *niwi(ḷ)	*mā-(ṉ) 4780/4781/4782	beast, deer; taboo avoidance homophone for *mā-(l/y)
 405/406/407/408-370/371	*amu-(ṅkk/c)- māl 168/169 4822 (refer to Section 4.8)	inspired/ 'high' on Sóma, Saumía, *Saumya* (epithet of Vāsudeva); consumption of *Ephedra* by people who imported it from the Gandhāri-s Aṁśú, Sóma, to press amukkirā (name transferred to Aśvagandha/ *Withania somnifera)*; Pārvatī, Aparṇā, Vaḷḷi, sister of Viṣṇu (references to a leafless montane plant/fungus, indicating possibility of *Ephedra*, *Cynchanum* (after migration to peninsular India), *Peganum*, or various fungi) (the Vedic people trade for Sóma with the Gandharva-s/Gandhāri-s to the North, where *Ephedra* sinica grows)

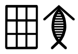
<table>
<tr><td colspan="3">Identified as the Sky Bull archetype that fertilises but is killed by the Earth Panther of the myth of the *weHḷ by the *weHḷ, who considered themselves the representatives of the Earth Panther archetype. In the converse version of the myth, by the *coHy themselves, it is the Sky Bull that kills/dominates the Earth Panther. cf. Pulikaṭimāl, and relation to Māl.(Parpola 2015, Chapter 18)</td></tr>
<tr><td>
405/406/407/408-845</td><td>*nal mā(l/ṉ)
3610/3611/3613 4781</td><td>Vasudeva, auspicious and good god
(Vr̥ṣṇi hero, the Good God);

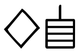
the black *māl
(related to Viṣṇu)

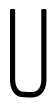
Āy Naṉṉaṉ, Ōymāṉ Nalli;

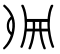
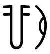
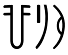
blackbuck
(black deer)

nalla māṭu, zebu, the
Sky Bull of Rain</td></tr>
<tr><td>
231</td><td>*mār(-i)
4818/4819
*mā-ka
4781
*coH-ṉay
1033/2899
*eẓ-(il-i/ut-)
851/848/849/853
*coH-mp
1056/1057
*eḷu, *oḷi
857
*coH-ku
2870
*coH-r
2884
*aṉantar
326</td><td>Śrīvatsa, Rakṣás (mark in chest making it similar to bear, OIA word ŕ̥kṣa);
Sītā, Lakṣmī/Rohiṇī (young goddess of fortune), Lakṣmaṇa;
Māri (rain cloud, God of Rain);
Karuppaṉ;
Nārāyaṇá;
Eẓiṉi;
Ōri;
to inscribe symbols, scribe;
sloth bear;
demon, rakṣás;
Anantaśayana</td></tr>
</table>

 820	*āẓi 398 *kāl 1483 *tir-u 3246 *el (<Middle East?) 829/861/869 *poẓ 4559/4555 *way 5517/5554 *ñācir̲ 2910	cakra; rathī, Nāsatyá of the Aśvín-s; time, the god of time and fate; Śrī, youthful divinity of fortune, the prosperous but demonic lower (Pātāla) realms of the 14 worlds; the Sun; (Viṣṇu, a Vedic solar deity) Sūryavaṁśa; city
 405/406/407/408-321 bull tied to stake	*kaH-(ẓ/ḷ) mā- 1501/1502/1494 4781 *kaHṉal *kaHyal 1464/1508 *kaHṉ(aM) mālay 1418 4827 *eru-(t/may) 815/816 *kūḷi 1918/1918/1920	Kāla, Kālī, Heramba, Mahiṣa, Bhairava the black (bull) *Māl (related to Kāla, Kālī, Bhairava, violent, destructive forms of Śiva); Rann of Kutch(?), backwaters, submerged land, reclaimed land, mangroves Vanamālī buffalo, animal of bogs and estuaries kūḷi, Garuḍa, demon, rakṣás
 615/617-243	*kar- nāṭ- 1284/1285/1278 3638	dark country, high country, black soil of Gujarat
 825 coconut	*teṉ-(ṅk-) 3408/3449/3426	Telu(ṅ)gu-s (southern people)

 615/617	*māl(-i) 4823 *walay 5288 *cat-(Vr/uw)/*kal-(ay/pi) 2327/1297 *cāl 2471/2472	Jāla, Māyā, Valaiyar Atiyamāṉ, Satiyaputo to read, to be skilled, erudition, knowledge, Kalaimakaḷ furrow, Sītā, Sīrá of the Vedic agricultural pair Śuná-Sīrá debt, loan, Kadamba
 595/596/597	*añ(c)c-(i/al) 55/54 *war-(i/ay) 5263 *kiHṟ-(ukk) 1623 *coH-lay 1070/2891	Añci, Atiyamāṉ king; Bhīma (fear); ōlai, a seal containing signs of quasi-linguistic nature (relay, postman, runner, related to Kr̥ṣṇa being a charioteer and messenger); Kīraka, scribe; poẓil, Udyāna, garden
 850-595/596/597	*takaṭ- akam/uHr 2995 7/752	the metal city, Tāmira-ampalam, Ceppaṟai, Cempukkōṭṭai, pū́ḥ ayasmáyī [Kr̥ṣṇayajurveda Taittirīya Saṁhitā 6.2.3.1]
Identified as the Raptor (related to both *Garuḍa* and *Gaṇḍabheruṇḍa*) archetype of the myth of the Snake-versus-Raptor of the **keHy* by the **keHy*, who considered themselves the representatives of the Snake (related to both *Vāsukī* and *Śarabha*) archetype		
 244	*cir-(M)-puḷ 474 4319 double-bird	Cimpuḷ, Gaṇḍabheruṇḍa *also found in BMAC, fighting a lion-bird hybrid, similar to Indian Gaṇḍabheruṇḍa fighting Śarabha*
 590 stake	*kaẓ-(u/i/ay/k/aṉi) 1361/1362/1355 *kūr-may 1898	Garuḍa, Vimāna; Gadā; Kūrma kaẓaṉi, backwaters

 700 pot	*kaṭa-(mp/l/) 1116/1113, (<NI substrate *ghaṭam) *kaẓ-u-(k-)/kaHṭ-ay 1362/1441 *kala-(c/mp/ṉ) 1305	Kadamba tree, or the ocean by homophony, pot Garuḍa, gharial; dhoni, kalam (ship); loan, debt, Kadamba
 805	*cippi 2535 *moẓ-(aṅk/al) 4989 *muẓ-(ku) 4993	śaṅkha, Pāñcajanya (the conch that unites the five peoples to war) murali, flute, to resound, to speak, to scream, Rāvaṇa; the flute-playing cattle herders (Kalittokai 143; Kr̥ṣṇa) Mukkuvar, pearl-divers
 388 fig leaf with flowers below 740-388	*atti-(maraṉ) *mēṭ-i 144/5090 *mañ(-ay/il) 4642 *att-(aṉṟ) 142	Udumbara fig peacock, Miñili lord, father
 803 bud of lotus/lily	*kumaḷay/(*tāmarac-) 2143/(3163) *kump(-p)- 1731/1732 *kum-ari 1740 *kump-i 1748	Kamala(-nayana), Padma(-nābha), Kuvalaya, Tāmarasa (blue lotus, lotus); Kuppam, coastal village, kummaṭṭam drum, to traverse, to sail, to voyage; Kumari, southern end, slash-and-burn cultivation (see next entry); mire, bog, estuarine region, Patala (port city in Sindh), Kṣīrasāgara (Rann of Kutch, the white/milky ocean)

 104 to leap, to step over, to cross, to go 803	*poH-(ṭ/k(k))- 4581/4574 *taH-ṇṭ/*weṟ-i 3158/5511 *kumari 1740	Lohṛī (Singh 1895),, Pōki; (harvest festivals, fire) Burning to harvest natural growth of Summer Monsoon, a proto-agricultural practice, Pōḍu (Telugu), Kumari (Tamil); Lohaṛ (Singh 1895) (Punjabi), Pōkkiri; (a scoundrel, vagabond) Related to *koHḷ, to seize, to set on fire; Tāṇḍava/Veṟi, Sóma *Ephedra* stimulant high; (intoxicated dance); Trivikrama, Viṣṇu's three conquering steps in the Vedas, the three steps to banishing Mahābali (the law-abiding monarch), *(burning Khāṇḍava (and killing the (agriculturalist?) Nāga-s))*
 335/336valley	*(c)iṟ-(ay/iṇ) 528/527/521 /522/524/2589	lord, king, ruler; Iravāṉ; Nārmará; valley fortress, canyons and traps; Rann of Kutch
 920320/318/322/323/ 324/ 325 symbol for 'bull' with two horns and legs, head on view, stylised, and eye  740-920  740-060-920	*kaH-(ḷ-ay)/ā- kaHṇ 1502/334 1443 *kaṇṇ-aṉṟ 1443 *kaHṇ-aH-aṉṟ 1443	Kāḷaiyar, bull-watchers, cowherds; Pāri (the seer/reader/Ṛṣi), Kāri (the black one); Andhaka, Vṛṣṇi, Gopāla, Vahnikula (prakritisation and resanskritisation of Vrishni, also Dravidian *kaH to burn, fire) Kṛṣṇa

 575 citadel, raised platform	*māṭ- *mēṭ- 4796 *araṅk- 8 *ecil 808	Raṅganātha, Lord of the Stage/Island, Kṣīrasāgara (Rann of Kutch, the white/milky ocean); Laṅkā (<EIA), riverine islands; Ilaṅkai Kiḻavōṉ (a preserved Caṅkam analogue of Rāvaṇa), a king of the Ōy-s, Ilaṅkai the capital of the Ōy-s; fortress, stronghold; Stūpa

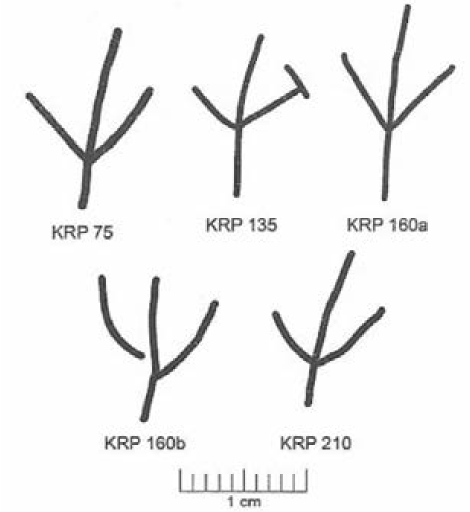
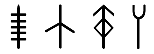
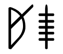
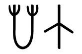
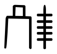
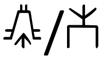
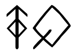
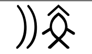
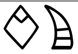


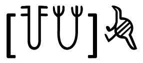
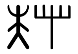
Fig. 6: Graffiti marks on spindle whorls from the same floor level of an early Harappan house, Karanpura, (Prabhakar and Majid 2014)

 413/411 069/070 517/518 064/392 spindle spindle whorls with pre-firing marks in Karanpura 069/070 sword  892-413/411 740-064/392 892-069/070 070-255	*kat-(ir/aw)/*eHk-/*ñaH-(ral/ram/wal/lam)/*yā 1195/1187/765/2903 2913/2914/5149 *koẓ-u 2147/2149 *kacc-/kañc/*kaṅk-/kāñci 1096/1099/1084/1085/ 1434 *cūral/kāñci wil 2727/1434 5422 *ñaHr-ay-aṉṟ 2911 *komp- wil 2115 5422 *maṟ-i/nar-i ñaHr-ay 4834/4764/3606 2911	to make thread, to tie, to spin, the Sun, the rays of the Sun, *Eugenia jambolana*, irrigated land, the world, Earth, Island of Kutch, Jambudvīpa; youth, young divinity of fortune, child, ploughshare; Kaccha, coastal area, monsoon winds, sea breeze; Kañcuka, corset, Dāmodara, araṇai-kayiṟu, oṭṭiyāṇam, Kāñcī-puram, Kāśī; Oḍḍiyāna; embankments, dockyard, waterfowl, *Cassia fistula*, koṉṟai; Nandaka, sword, kacci; Calamus rotang, Śūrasena, Śārṅga-dhanvan, Ōymāṉ Villi, Kāñci/Vañci; Nārāyaṇá, Sarus crane (holy bird), Krauñca; Aja-Ekapād (by visual similarity to a stick-figure with one leg only; also, a crane often stands on one foot); (*paired with *keHy*) Nara-Nārāyaṇa (paired with **keHy*)
 760-070 501	*ñaHr-ay mal-ay 2911 4729/4742 *kat-ir mal-ay 1193 4729/4742	Krauñcagiri, between Vaṭapoẓil and Nāvalpoẓil, Karūṁjhar hills; the Mountains of the Sun, Vaikuṇṭha (<*way koṉṟ-am, synonymous)
 923-069/070	*kaṅk- pāmp- 1085 4086 *ñaHr-ay/kāñci-(ray)/kaṅk-yaHṟ 2911/1434/1085 5159	dockyard, dams (as found in Lothal); Nārā paleochannel of Indus and Hakra; Kāvēri (<kāñcirai); Gaṅgā

 133/134/135	*kil-ñar- 1574 2904 *yā(ḷ/ṇ) 5157/399 *eHkk-aṉṟ 768 *katir-aṉṟ 1193	Kinnara, ki-na-rum (Sumerian) (Parpola 2015, 171-172), lute player, Rāvaṇahattha (instrument, visual similarity to arms), Kiṉṉāram (Prasad, 2022); ruler, man, Ánu; great man, noble, hero, warrior; Sun; Hṛṣīkeśa, hair standing on end
 575-413/411 861-064/392 690/692-517/518  585/570  517/518-849 585-805/806 585-017 585-017-033- 704/705/706/707- 803	*kat-(aw-/ir)/ñaH- araṅk- 1195/1187/2914/2913 8 *kat-(aw-/ir)/ñaH(wal)- akam/koṉṟ- 1195/1187/2914/2913 7 *kat-(aw-/ir)/kāñci pāḻi/ tuṟ-ay 1195/1187 4113/4046/3365/3370 *(kat-(aw-/ir)) ecil 1195/1187 808 *pot-(i/aw) ecil 4274 808 *eHḻ- ecil 910/848 808 *puk-(aw/ār) 4238 *kumaḷay kuṇṭa(M) muH eḻil pukār 2143 1828/1669 5052/4954 848	Dvārakā, Dvāravatī, the island-city-with-doors that sank, Tuvarai, Kapāṭapuram; Jambudvīpa, Nāvalampoḻil, the rose-apple shaped island (Kutch); Potiyil, Potiṉi, Potikai; Māvilaṅkai (the great riverine island/black riverine island), Ilaṅkai, capital of the Ōymāṉ-s (retained historical memory from IVC) Krauñcagiri, between Vaṭapoḻil and Nāvalpoḻil, Karūṁjhar hills; city of the Sun, Sūryapattana (Σωπάτμα of Periplus) (city in Ōymāṉāṭu); Ēḻil, the beautiful fortress, surrounded by the seven seas/rivers; Nārmará, Ūrjáyantī, the island /valley fortress, ruled by Sahávasu; (*Vāsudeva*?) (RV 2.13.8) Pukār, estuary; Pūmpukār, Kāvērippūmpaṭṭiṉam that sank; Potiyil of Talaiccaṅkam and Kapāṭapuram of Iṭaiccaṅkam that sank; Ēḻeyil Katavam, Tūṅkeyil Katavam etc.; Kāñci of Toṇṭaimāṉ, Vañci of Cēra; Cempukkōṭṭai Tuvarai, maybe metaphorically as the gateway to the Indus Valley (?);

6.1.2.3. ***keHy** *Pradyumna/Arjuna/**kēral/*Pūrú*/Cēyōṉ

Indus Glyph	Proto-Dravidian	Meaning and Reasoning
 904-235	*wāṉ(-aM) war-amp- 5381 5261 *wāṉ yaHṟ 5381 5159	Pradyumna/Arjuna/*kēral/Pūrú/Cēyōṉ Mars, Moon, North, Red, Sino-Tibetans/ Burushos, Kirāta-s, (Nará), Bekanā̆ṭa, BMAC-related people, Índra, Agní, Sóma, Rudrá, Keśín, Kāma, Nara, Aja
 817 240	*kēr(-al) 2005 *kēr-i 2007 *kē-wal 2818 *kē-y 1931	Cēra; Neṭuñcēral; Kērala; accounts; refuge, to join, town/hamlet; fowl; the Red God
 482	*muṉ-(i/ay) 5020/5021	the head, the foreman, guardian gods in the boundary of villages (ellai kaṭavuḷ), army commander, the first; Muni (as a descriptor of Kapila and demons in Brahmanas and Āraṇyakas, later word for sage), Gaṇeśa; *(first/foremost god, army commander)* Muṉiyappaṉ, Munīśvara
 861-495 740-817-491 west and citadel (Bhaskar and Mahadevan 2017, 359-376) 861	*koṭa-kō 490/491/492/493/494/495 2178/2177 *koHṭay-kēr-aṉṟ 490/491/492/493/494/495 2005/2007 *akam/kō 7/2178/2177	Kuḍakkō (citadel during loo) (Balakrishnan 2019); refuge during the loo Ātaṉ (Akattaṉ, lord of the Citadel); Agastya; Kō, mountain, mountain tribes, king, citadel
 154/155/156/157	*[ciru(-M)] poṟ-ay 474 4565 *caHta/coHṟ-poṟay 2897 4565 (Mahadevan 'Meluhha and Agastya: Alpha and Omega of the Indus Script' n.d.)	Irumpoṟai (double-carrier, kavadi-bearer) Sātavāhana; Sātakarṇin (with the symbol for food resembling the ears on a head); Bharadvāja, Bharatá, epithet of Agní, Rudrá, the carrier of oblations to gods

 095 man holding a stick 520-095	*taṇṭ- 3056/3055/3054/3049 *paṭ-ay 3860 *paHṭ-i 4064 *paHḷ-ay-amp 4117	Herdsman, lord of the herd, army commander, commander of the summer hordes, Devasenāpati, Vrāta; Dásra of the Aśvín-s; Pāḷaiyam (summer army settlement); Vrātya, Vrātapati, Ganapati, Pramathapati, Daṇḍapāṇi, Pinākahastin
Myth of the quail and the fish, the *Gandharva*-s defending holy lakes, later traditions of *Nagaravadhū* and kings, priests and *Devadāsī/ Viṟali*-s, the *Cakora* in love with the moon, *Purūrávas* and *Urváśī*, *Kāma* and *Rati* etc.		
 [740-760]-266/268	*pūẓ-i 4374 *maṇa-[waHḷ-aṉr] 4667/4668	Pūru, Tittiri, Gandhāra, Gandharva, Cakora, Purūrávas, Maṇavāḷaṉ, Piśāca
 100-415 220-415	*niwiḷ kaṇṭ- 3692/2922 1173 *niwi(ḷ)- takar 3692/2922 3000/3001 *niwiḷ miHṉ 3692/2922 4885/4876	Nīlakaṇṭha, Vaiśravaṇa (from the horns interpreted as ears), also Candraśekhara (by horns looking like crescent moon) (Mahadevan 'How did the 'great god' get a 'blue neck'? a bilingual clue to the Indus Script' n.d.); tin-extractor; Nīlā, Ilā, Aila-s, Urváśī, Airāvata (Mahadevan 2011)
 220-063 *car- to slip, slide, move	*car-ac- miHṉ 2360/2359 4885/4876	Aramakaḷir; Apsarases
 063	*car-ac-/*car-ap- 2360/2359/313 *ta[v/m]Vẓ- 3109/3080	cobra, Vāsukī; snake totems in Gonur Depe (BMAC) made of Indus Ivory Śarabha, markhor/snake-eater/snake-horned; aravā-nāṭu, Aravam (Tamiẓ); to leap, to crawl like a snake, Draviḍa, Nāgá

 840	*muruk- 4979/4978	Kumārá, Murukaṉ (youth, adjectives for Cēy and Śiva/Rudra; the ancient and persistent longevity myth about the Burushos, Kalashas etc.) (Mahadevan 2006, 175-177)
 704/705/706/707-240	*key(-aM) kuṇṭṭ- 1931/ 1671	Rudrá, Kapila (Magadhan deity); ulaci-mīṉ, uṇacimīṉ, Ulūpī (porpoise)
 892-890	*waHṅk-wil 5335/ 5422 *paHṇ 5236/4068/3884/3887	cāpa bāṇa; yāẓ/vāṇa/harp player, Yāẓppāṇar, Perumpāṇ, Ciṟumpāṇ; Paṇí, Parni, Vaṇij; trader; Sthirádhanvan, Kṣipráiṣu, epithets of Rudrá, Skuθa, Scythians originating in the BMAC/ Yaz culture
 630/631/632/633/634/635 teeth, bite	*piḷ- 4194/4195/4198/4149 *kañcc- 1097 *kac- 1093	elephant, youth, Gaṇeśa, Piḷḷaiyār, Airāvata, Teyvayāṉai bhaṅgá, gañja (*Cannabis*) gaja, myth of elephant that has the crocodile under its foot Khaśa-s, Káśmīra (large scale export of Indus ivory to BMAC) (Frenez 2018, 13-33)
 798/797 crocodile (Parpola 2015, 199, 200, 270)	*nekaẓ- 3732/3733/2923 *moc(/t)al-ay 4952/4950	makara, nakra, vehicle of the ocean god and Kāma, Śiśumāra, Mutalai (sacrifice of first son) ;(Parpola 2015, 199-200);; Muyalakaṉ, Apasmāra (epithet of being under foot also may be related to Gajendramokṣa, where elephant is related to Śiva) (Parpola 2011, 1-57); Kaṭalōṉ, Kaṭalpiṟakōṭṭiya Ceṅkuṭṭuvaṉ, the Nāga-s who constructed Dvārakā, Kubera who constructed Laṅkā, the Asura-s who churned the ocean

 777/778 776	*koHḷ-i 2151/2254 (Parpola 2015, 282-283) *koḻḻi 2151/2152/2158/2064 *waṭ(ṭ)-(a/i)- 5218/5220	Hara, Fire; Waddar; Baḍava (Kannada for ‘poor’, opposite of Śrīmanta), the sparse yet holy upper realms Svarga/Kailāsa; Vaṭukar, northerners; Vaṭapoḻil (Paripāṭal 5-9), the northern gardens, Oḍḍiyāna where the Gandharva-s live (Khyber Pakhtunkhwa); Nyagrodha fig
 255 318/320/322/323/324/325-255	*kapar- 1327 *koṇṭ-ay 2081 *kapari kaH 1327 1051 *nar-(i/aḷ)/maṟ-i 3606/3605/4834/4764	tufted hair, yak tail whisk; Kapardín (as described as the hair of Rudra), Guḍākeśa; braided, pleated hair, hairstyle of the Iranians and Vedic people, Burushos and BMAC; yak, animal of Tibetans Nara of Nara-Nārāyaṇa pair, Aja of Aja-Ekapād pair to frighten, to terrify, Rudra
 921-240	*kay-al kaṇ 1252 1443	carp-eyed, Mīnākṣī, Mongoloid eyes (as depicted in Guḍimallam Liṅga for instance); Kaivarta
 740-266 sparrow	*kil-aṉṟ 1577/1594 ‘small man’ *kuṟ-(aḷ/ava) 1851 a type of ghost/dwarf (sparrow has connotations of small, even in Egyptian Hieroglyphs; its names *ciṭṭ- *kuru-vi both mean small)	Sanskrit Kirā(n)ta (<Kilānta (Eastern Indo-Aryan)); Vāmana, Kubera (in AV. an evil spirit, in SB. a lord of thieves, like Rudra; patron of merchants); Sino-Tibetans
or 832/834 appears like a grain, unhusked rice	*nel-añc 3753/3754 *tiṅkaḷ 3213	the Moon, Sóma; Candravaṁśa

(cf. previous entry) The Vedic Indo-Aryans, being an adopted elite-class of the BMAC, tended to more strongly associate with this group, and thus the Vedic Lunar Dynasty is contrasted with the non-Vedic Solar Dynasty. (Bronkhorst 2016) (Parpola 2015, Chapter 13) The Eastern Indo-Aryans lived in areas of **pāṇṭi* and **caHy* heritage but the primal contrast between **keHy* and **coHy* was preserved by the Greater Magadhans (with two separate clines in them: *Kosala-Videha* with Solar claims and partial Vedic and Indus heritage and the *Magadha-Anga-Vanga* cline with a greater and more exclusively Munda heritage) claiming descent from *Ikṣvāku* and claiming Solar lineage. (Mahadevan 2015) (Bronkhorst 2007)

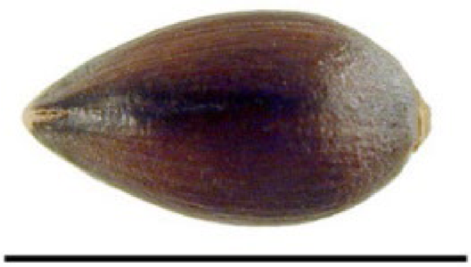
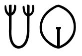
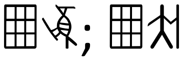
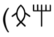


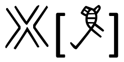
Fig. 7: Ephedra sinica seed (USDA)

 390-370/371 grain embedded in stalk, symbol for moon on a stick  760-838	*amu-(cc/ṅkk)- (< BMAC) wiḷ 168/169 5437 *waḻḻi- waḷ-am 5316 5304	Aṁśú, Sóma, to press amukkirā (name transferred to Aśvagandha/*Withania somnifera*); Pārvatī, Aparṇā, Vaḻḻi, wife of Śiva(references to a leafless montane plant/fungus, indicating possibility of *Ephedra*, *Cynchanum* (after migration to peninsular India), *Peganum*, or various fungi) (the Vedic people trade for Sóma with the *Gandharva*-s/Gandhāri-s to the North, where *Ephedra sinica* grows); Sakā haumavargā

 142 365/367/368-262/ 263/264 /266/268/279/280 leaf suffix 279/280 266  615-262/263/264/266 /268/142 265/267/269/ 270/271	*pē-(k-) *wēl- 4438/5536/4428 *pekk-āk- *picc-āk- 4128/4126/4142 335/333 *pekk- *picc- 4128/4142 *pikk- *picc- 4126/4142 *pikk-(aM) nāṭ- 4428 3638 *pēy *pikāk- *pecāc- 4438 *pik-iṉāṟi 4144	Bekanā́ṭa (RV) (usurer, name of a foreign people; also salt-lander (Potohar Plateau and Salt Range), miser); Pika (cuckoo, Dravidian word for bird); Pínāka, Vēl (stick/bow of Śiva/Murukaṉ; priest of Cēy); Piśāca, Paiśācī/Gāndhārī language (ghost, hordes of Śiva; also the name of a Northern people (Dards, Burushos, Nuristanis)); Purúṣa, Puruṣapura/Peshawar, Burusho (ethnonym of the Burushos); Pēy, Picācu, ghost, God; Koḷḷi-vāy-pēy, fire-mouthed; Kuṟaḷay-pēy, dwarf; Piciṉāṟi, miser; bhūtagaṇa-s of Śiva; Bēk in ND, salt; Piccu/Pittu madness due to entheogen, *Cannabis* (Śiva is depicted as intoxicated); Pekka (calf of leg); Pēkaṉ; myths of Cakora partridge in love with the Moon and Sóma growing with the Moon
 503 mountain	*mica(l/r)-(u) 4841/5086 *kō 2178/2177	Ilāvr̥ta/Meru legends, Airāvata ( *nīḷ- mīṉ 'Iḷā'; Burushaskis); mountain, mountain tribe, king
 463-240	*keHy malay 1931 4742 *cim-ay(-aM) malay 2545/2544 4742	the Red Mountains, the Shining Mountains; Himālaya, Shimla; Upāirisaēna (Avestan), the Hindu Kush 'above which the birds cross'; Vēṅkaṭam, northern mountains, Kailāsa, the mountains of the White Metal/Plate (tin) used to make bronze, and epithet transferred to bronze; Vaṭapoḻil, the northern gardens, Oḍḍiyāna where the Gandharva-s live

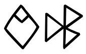
 215 *Adenanthera pavonina*	*maṅk-āṭi 4636 *maṅk-aḷ 4635 *maṅk-i 4637/4638	*Adenanthera pavonina*, a bright red seed; Turmeric, by homophony; Auspicious rituals etc. (Maṅgala), Mars; *Cannabis*; large ship used in trade, mast of a ship, 'Magilum' in Sumerian (Parpola 2015, 217)

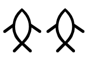
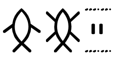
*6.1.2.4. Aniruddha/Nakula/*pāṇṭi/Turvaśá/Koṟṟavai*

Indus Glyph	**Proto-Dravidian**	**Meaning and Reasoning**
	*[maHṟ] waẓ-ti/pāṇṭi	Aniruddha/Nakula/*pāṇṭi/Turvaśá/Koṟṟavai Jupiter, Centre/East, Golden, 'Kubhā-Vipāś' substrate, Para-Munda, Hakra Ware, Sothi-Siswal, Śūdra-s, Madra-s, Turvīti, Śatrughna, Pūṣán, Márut-s (Rudrá's Gaṇa-s), Kubera, Ekānaṁśā
 140 man with sword	*(kaṭ)kaṭ-(i-kay) 1124/1127 *caṇṭ-(ay) 2318 *koṟṟ- 2169 *maṟa- 4763 *cūṟay 2744/2743 *kuṇil-ṉṟ 1684 *por- 4540	khaḍga, padāti; Koṟṟavai, Koṭavī, desert-dweller, Caṇḍī, Caṇḍikeśvara, Caṇḍāla, caṇṭittaṉam meaning menace; rhinoceros; Kuṇinda, Yaudheya; Madra-s; Marút-s, the gods of lightning, wind, thunder and storms; Maṟavar; Śūdra-s (raider/pillager; Συδροι fought by Alexander); Aniruddha (Vṛṣṇi Hero); Porunaṉ; Dásra of the Aśvín-s; Satvant, conqueror

 255	*ma(H)ṟ-(i) 4834/4764 *kuṭumi *toHẓ/toHṇṭ/nar-i 3548/3606 *kap/kapar 1325	sheep, goat, antelope; Māṟaṉ; barter; Ajā́śva, Ágohya (epithets of Pūṣán); Kapardín; (Mutu-)Kuṭumi; wolf, jackal, dog, animal of Bhairava; Kavā́ṣa
 435/436	*koḷ(ḷi/tt-) 2151 *ceṇṭ- *ceṭ-il 2761/2759 *ceẓ-i 2789 *tura 3340/3339 *tuṟa-ṭ- 3366	receiver, trader; Ā́ghṛṇi (epithet of Pūṣán), Koḷḷi; Áṣṭrā (epithet of Pūṣán), goad, Turá Ceẓiyaṉ; lightning, thunder; tunnel, excavation, underground, mine (copper?) elephant goad; *Pleonastic Compound with next glyph*

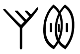
 690/692	*wa(H)ẓ-(i/ti) 5292/5297/5372 *ampal-(i/am) 173/174 *paHẓ-i 4112 *paHṇṭ-i *kuHṭ- 1882 *tuṟ-ay 3370 *tuṟ-a 3365 *tuṉ- 3372	Karambhā́d, Vidátha, Patháspáti (epithets of Pūṣán); PIE *péh₂-usōn ‘protector’> Pūṣán, reinterpreted as ‘prosper-er’; Vaẓuti; Pāṇṭi; Kubera Turvaśá, Tuiriia (the controller of the four directions/roads), or derived from *tuṟ; square burials of the Vedic people (as opposed to the mounds of the Asura-s, stupas and megalithic burials of Dravidians); (Parpola 2015, 150) Tīrthá, Tuṟai, a ford, river-crossing, meeting place, crossroads, a pilgrimage site; renunciate; Tīrthika (Buddhist term for other Śramaṇa traditions), Śramaṇa (sufferer, toiler)
 740-266 sparrow	*kil-aṉṟ 1577/1594 ‘small man’ *kil 1574/1575 *kuṟ-(aḷ/ava) 1851 a type of ghost/dwarf (sparrow has connotations of small, even in Egyptian Hieroglyphs; its names *ciṭṭ- *kuru-vi both mean small)	Sanskrit Kirā(n)ta (<Kilānta (Eastern Indo-Aryan)); Vāmana, Kubera (in AV. an evil spirit, in SB. a lord of thieves, like Rudra; patron of merchants); Yakṣa-s, a nature-spirit class of great prosperity; poet, singer, dancer, actor; Ilūṣa/Śilūṣa
 175 pig	*paṉ-ṟi 4039 *wari-ñci 5265 *uẓu 688	Varāhá (< PII *warāȷ́ʰás possibly related to *wrī(ñ)ȷ́ʰí ‘rice’ < PD *wari-ñci); the one who ploughs in mud, brings the Earth out after rain and floods and fertilises it, *Oryza sativa* var. indica cultivation (Parpola 2015) () ; Panjurḷi (Tulu) (the toothed one, pig); to plough marshy, slushy ground like for rice cultivation or like a pig; Vrīhí

 455 the embroidery found on the ‘Priest-King’ sculpture  861-455	*poṉ/*ciṉ 4570/2596 (refer to Section 6.2) *waliyal 1005/1000 *poṉ/ciṉ- akam 2596 7	Hiraṇyakaśipu, Tārpyá, Oliyal, golden ceremonial drape; golden, Jupiter, yellow alluvium of Ghaggar basin; (Singh 2008, 109, 145, 153) the golden citadel, pū́ḥ háriṇī, Ciṟṟampalam, Poṉṉampalamēṭu, Haridvāra; Ekānaṁśā (golden complexioned) (Welt Museum Wien))
 868 symbol for citadel with wall/partition	*matil 4692 *koHṭ- 2207 *aru-ppam 229	Matiṟai of Talaiccaṅkam; Mathurā; Araiyam in the Sangam poems; Durgā, Śāradā; Ekānaṁśā (‘one without a part’, resembling the symbol), sister of Viṣṇu and one of the archetypal triplet of Saṅkarṣaṇa-Ekānaṁśā-Vāsudeva, one of the three old peoples of the IVC
 868-704/705/706/707-590	*kaẓ-(akaM)- kuẓu/kuHṭal matil/aru-ppam 1361/1345-1821/1882/1669-4692/229	the Walled City where the assembly gathered; Buddhist Saṁgha, the Gaṇasaṅgha-s of lower Gangetic plains; Kaẓāttalaivar (head of the assembly/senate?) who cursed Araiyam to be destroyed; the three Caṅkam-s gathered in Madurai
 704/705/706/707	*paḷḷ-(am/i)/*kuṇṭṭ/kuẓu/kuHṭal 4016/1660/1669/1821/ 1882 *paṭ-(ṭ-i) 3868	pit houses (Hakra Ware), pit, hole; paḷḷi (name for village throughout South India, Maharashtra, Gujarat, Sindh and Punjab), hamlet, village, settlement; paṭṭiṉam, Paṭṭana, Pātāla (subterranean regions of immense wealth); gathering/assembly
 900	*par-(amp/ikay) 3958 *wēy-mp 5532/5531	carma, *Azadirachta indica*
 545	*paṟ-(ay/amp) 4032/4031/4026 *cur-aṉ 2683	drum, Paṟaiya-s, desert, wasteland (the Thar), dhánvan
 384/385	*arac- 202/201 *kuruk- 2125	Pippali/Aśvattha fig; king; heron, Krauñca

 510/511/512/513/514	*maẓ-u 4749	Malava-s, Paraśurāma, Maẓavar
 405/406/407/408-321	*kaH-(ẓ/ḷ) mā- 1501/1502/1494 4781 *eru-(t/may) 815/816 *kūḷi 1918/1918/1920 *kalay mā 1312 4781	kalaimāṉ, Ṛśya, Kāla, Kālī, Heramba, Mahiṣa, Bhairava the black (bull) *Māl (related to Kāla, Kālī, Bhairava, violent, destructive forms of Śiva); bison/buffalo, Mahiṣa, Heramba, kāḷai māṭu kūḷi, demon, rakṣás
Identified as the Old Inauspicious archetype of the myth of the *coHy* by the *coHy*, who considered themselves the representatives of the Young Auspicious archetype.		
dumb, Mūkāmbikā; 520-033	*muH-(t-/tt-/ṅk-) amp-5052/4954 183 *muHṅk-(Vc) 4900	old, disheveled, haggard divinity of misfortune; Jyeṣṭhā, Mūtēvi, elder sister of Lakṣmī; dumb, Mūkāmbikā
 700-033 590-032	*muH(-ṅk) kaHṭ/ẓ- (ay/k-) 5052/4954 1362/1441	the dumb bird, owl; mongoose, Nakula
 099	*kor-(aṅk/tta)- 1769	Kuruṅga, Kuluṅga (Vedic chieftain); Vānara; Kōtta-s
 or  219 or 220-240-002	*miHṉ 4885 *kay-(al) 1252	Matsya kingdom, Meena tribe, Kaivarta (<*kay-al), Masiiakata people of Bactria the fishermen
or 783/784/785/786	*tuḷ-(ac/aṅk) 3357/3359/3360	tuṇaṅkai; Naigameṣa, to purify (Parpola 2015, 284-285);; Tulasī, Vṛndāvana
 850-031 575-031	*koHl-(li)- uHr/akam 2237/2137 7/752 *kol-(li) araṅk- 2237/2137 8 *kol-kkay/kolli 2237/2137	Koṟkai, port city and early Pāṇṭiya capital; Kollūr, city where Mūkāmbikā is worshipped; Kollimalai, Kolāpura; valley, gulf, bay, ravine the pole erected for Indra worship in Indra-Jatra and Intira-viẓavu

6.1.2.5. Sāmba/Sahadeva/*caHy/Yádu/Kaṭalōṉ

Indus Glyph	Proto-Dravidian	Meaning and Reasoning
 520-233 740-233	*caH-amp- *caH-aṉṟ- *caH-(y) *caH-li (<Munda) *caHl/*caHṟṟ- 2486 *caHl- 2470 *moHṭ-, *moHṇṭ(ṭ)- 5114/5115/5135	Sāmba/Sahadeva/*caHy/Yádu/Kaṭalōṉ Mercury, Rāhú, East, Yellow, Śa(m)bara, Ābhīra-s, Śāstā, Ayyaṉār, Ayyappaṉ, Cāttaṉ (these words are given separate ad-hoc IA etymologies, but come from same Dravidian word), Śāntā, (para-) Mundas, Nāsatyá of the Aśvín-s, Saka-s, Sarmatians Buddha, Jina, Śramaṇa-s, "Greater Magadha" To lay down, to be euphoric (effects of Areca nut, whose use originates in South-East Asia) to announce, to beat a drum, to proclaim, to announce, to declare, Buddha, teacher, Paṟaiya-s; the wise one, the noble one, one of knowledge and teaching, Śāstā (common epithet for Buddha), Cāṉṟōr; śāli, cāli, wetland rice, *Oryza sativa* var. *japonica;* (Bates, Petrie, and Singh 2017, 193- 201) Muṇḍa, bald, horn-less (antithesis of *kaṇṭ-), stupidity, dullness of sense (pejorative)
The group and deity are both amalgamations of a central Asian group and a later south-east Asian group. Beckwith's proposal of Buddhism's origins in central Asia 87 due to the cultural similarities and the name of the *Sākya* tribe is thus probably with basis but the relationships are of a far greater time depth than proposed in the work, and Buddhism itself is of eastern Gangetic plain origins, although its rapid adoption in the north-west might again be due to the preexisting cultural similarities enabling rapid diffusion.		
 384/385-233	*caH-(l/k) maraṉ *mak- 4621 *caH-(y) >*taHy > *tēH-(ṅkk-) 3452 *caH-(ntt) 2448	Sālabhañjikā (Sarna burhi of Mundas), Yakṣa, Sākya, Cākkiyaṉ dancing community (eastern tribe, worship the Sāka/Sāla tree) Magadha, the language of the lower classes in Sanskrit plays tree of Mahāvīra's enlightenment and Buddha's birth Sākala/Sāgala Sal groves of Munda tribes in Sarnaism Teak, (*c > *t irregular change across all branches (Krishnamurthy 1960, 124 Rule 13b), sāgu in Kannada), replaced Sal after migrating to the south? (called Śāka/Sāka in IA just like Sal) Tökisy (<*tēkk-il-i, the one who lives in the teak?) (Lagachu 2020, 56-59), the god of the Toda-s (a vegetarian, pastoralist tribe of Nilgiris), analogue of the Sal worshipping Munda-s Cāntu, Candana, Gandha, Gandhamādana

<table>
<tr><td>
233</td><td>*pac-
3936/3821
(Parpola 2015, 276)</td><td>Hári, Budha (the philosophies of Greater Magadha, and Buddha too)
(the wise one; contrarian)
yellow alluvium of the Ghaggar basin (Singh 2008, 109, 145, 153)</td></tr>
<tr><td colspan="3">Epithets of *keHy, *coHy and *pāṇṭi mixed, eg. Sāmba/*poṟay, Solar Dynasty/cow-herding/Potiyil and goat/Munda~Para-Munda respectively, due to paucity of native epithets, later interaction with and introduction to the IVC, and inferior social status (*caHy>Pañcama, the fifth, Pariahs; Muṇḍa (bald, hornless) a Dravidian derogatory term in contradistinction with Gaṇḍa (horn-ed, superior person)). When claiming independent sovereignty in myths, often adopts the epithets of the other peoples (more frequently than usual) due to their more-established status in the IVC. The story of Ayyappa being the child of Śiva and Viṣṇu might also be relevant to this eclecticism.</td></tr>
<tr><td>
797/798</td><td>*nekaẓ-
3732/3733/2923
*moc(/t)al-ay
4952/4950</td><td>makara, nakra, vehicle of the ocean god
(sacrifice of first son);
Muyalakaṉ, Apasmāra (epithet of being under foot also may be related to Gajendramokṣa, where elephant is related to Śiva) (Parpola 2011, 1-57);
Rāhú, the snake/crocodile headed demon, the seizer that swallows the Sun;
Nihali, Nahāla, people of the Bhil region</td></tr>
<tr><td colspan="3">Identified as the Crocodile archetype of the myth of the *keHy by the *keHy, who considered themselves the representatives of the Elephant archetype.</td></tr>
<tr><td>
405/406/407/408-844
to tie</td><td>*yāṭ-
5149/5152</td><td>goat, Yádu, goat-herd, Yātudhā́na (goat keeper</td></tr>
<tr><td colspan="3">Identified as the Demon of the Fort of the myth of the *keHy by the *keHy, who considered themselves the representatives of the Fort-Destroying Hero archetype.</td></tr>
<tr><td> 176/177/178/179</td><td>*cey-(t/m-)
2776/808/805</td><td>Eyiṉaṉ, Eyiṉar, people of the fort/lance (Indo-Aryan back-formation>saṁvara> Śa(m)bara (Parpola 2015, 259);
Śambara whose forts were destroyed and who was defeated by Índra;
Śambara who was killed by Pradyumna;
Śabara, a name for Munda forest-dwellers;
Sairima, Sarmatians, who carry lances</td></tr>
</table>

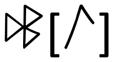
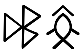
or 136 or 130 person with plough	*to(ṇṭ/ẓ)- 3524/3525 *uẓay 680 *viṉ-ay- 5445	Pallava-s, Toṇṭaimāṉ (slave, devotee) Śramaṇa Vināyaka-s
 151	*poṟay 4565 *kōc- 2192	a carrier, peon; Kosala; Kōcar
 154/155/156/157	*[ciru(-M)] poṟ-ay 474 4565 *caHta/coHṟ-poṟay 2897 4565 (Mahadevan 'Meluhha and Agastya: Alpha and Omega of the Indus Script' n.d.)	Irumpoṟai (double-carrier, kavadi-bearer) Sātavāhana; Sātakarṇin (with the symbol for food resembling the ears on a head); Bharadvāja Bharatá, epithet of Agní, Rudrá, the carrier of oblations to gods
 157-805/806-465/467/468/469/470/471/472/473/474	*poḷi-māwi caHta-poṟay 4560/4562 4784 2897 4565	Puḷumāvi (crushed seed flour carrier)
 831/833	*aṭay- kāy 88 *pākk- (<Austronesian) 4048	Areca nut, a symbol of auspiciousness, a drug
 465/467/468/469/470/471/472/473/474	*cim(m)u-kka 2548 *eHw- 805	Cimuka; (javelin thrower) Evvi, Śarvá, Vajrá; Sarmatians, Sakas
 159/161	*cey- poṟay 808/805 4565	lance carrier; Sakā tigraxaudā, the Sakas with the pointy caps who also carried lances/spears, visual similarity with the symbol for them

6.1.3. Planets Planets (Parpola 2015, 314) (Parpola 1994)

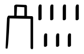
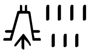
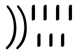
Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 550/551	*koHḷ- 2151	Planet, Kōḷ, Graha not used with the planet names due to taboo
 220-233	*pac- miHṉ 3936/3821 4885/4876	Mercury, Green Star
 220-032	*weḷḷ-i miHṉ 5496 4885/4876 *wāl miHṉ 5365/5364 4885/4876	Venus, White Star, shooting star/ meteor/comet
 220-240	*keHy- miHṉ 1931 4885/4876	Mars, Red Star
 220-455 (visually matches 'Priest-King' clothing, gold)	*poṉ/ciṉ- miHṉ 4570/2596 4885/4876	Jupiter, Golden Star
 220-405/406/ 407/408 (euphemism)	*māy- miHṉ 4780/4781 4885/4876	Saturn, Black Star

6.2. Miscellaneous

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
 455	*wal-i-al 1005/1000 *poṉ/ciṉ 4570/2596	golden dress, (visually matches 'Priest-King' clothing); Tārpya (sky-garment of Varuṇa); ritual clothing; Oliyal

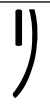
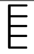
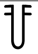
<table>
<tr><td>
455[066]
a scythe, to shave off</td><td>*[ciH-(nt-/ṅk-)] wal-i-al
2600/2601/2617/2598 10
05/1000/9992600/2601/2
617/2598 1005/1000/999</td><td>Homophonous for ‘river’, thus, might refer to the river Indus
(jambunāda gold, Kāviri is also Poṉṉi ‘golden river’ etc);
Síndhu, Indus, the date palm river, Sanskrit sīdhú (liquor), the generous river;
Seng Tsang Po, Sher Darya, the lion river;
Surāsamudra, ocean of toddy</td></tr>
<tr><td>
455-235

456/458</td><td>*wicump- wal-i-(al)
(where *wicump- is a synonym of *wāṉ, sky)</td><td>The ‘Sky River’;
The Ghaggar-Hakra River, late- Vedic Saraswati also known as Vaiśambhalyā (Witzel 1999, 1–67), etc. (related to later Ākāśagaṅgā)</td></tr>
<tr><td rowspan="2">
825-775/776</td><td>*waHṭ-ay teṉ-ṟal
5218 3449</td><td>the part of the year from winter to summer</td></tr>
<tr><td colspan="2">Northwest Monsoon/Western Disturbances and Southeast Dakṣiṇāyana, season where native crops like rice and millets grow, the vrātya season of theft and pillage (Parpola 2015, 249)</td></tr>
<tr><td rowspan="2">
775/776-
490/491/492/493/494/495</td><td>*koHṭ-ay waHṭ-ay
2203 5218
*kōṭṭay waHṭ-ay
2207 5218</td><td>the part of the year from summer to winter
púraḥ śāradīḥ</td></tr>
<tr><td colspan="2">The Loo, occurs only in northern India but Dravidian languages have four words for four different winds based on direction; indication of Dravidian languages having been spoken in the far northern Indo-Gangetic plains, Punjab
Uttarāyaṇa, season where foreign crops like wheat and barley grow, the vrātya season of staying in settlement and performing agriculture (púraḥ śāradīḥ, autumnal forts) (Parpola 2015, 249-250, 257)</td></tr>
<tr><td rowspan="2">
070-
490/491/492/493/494/495</td><td>*koHṭ-ay kaccāṉ
2203 1096/1094</td><td>the part of the year of the summer and Southwest monsoon</td></tr>
<tr><td colspan="2">Kaccāṉ, the southwest monsoon in the lower Indus Valley, the long onshore wind
Large scale rice agriculture in Saurashtra region of the IVC</td></tr>
</table>

 480/479 angle(pictogram)/to enter(ideogram)	*koHṇ/*tuHṟ- 2209/3399 *koṇ-ṭal 2078	East; Eastern wind, the South-west monsoon (which blows from the east in the Punjab) (Balakrishnan, 2019)
 462	*muH koṉṟ- 5052 1864 *kuruk- malay 2125 4742	Trikūṭa that Śiva destroyed; Kurukumalai/Krauñcaparvata that Murukaṉ destroyed; mountains that Índra struck down; Vindhya that Agastya pulled down
 861-003	*muH akam 5052 7	Tripura, the three citadels (of gold, silver and metal) [Kr̥ṣṇayajurveda Taittirīya Saṁhitā 6.2.3.1]; Ampalam-s of Naṭarāja;
 844-140 symbol, to tie up 845-140 symbol for *nal and similar to tie up	*kal-(i) yā-(ṇar) 1308 *maṟi yāṭ- 4834/4764 5149/5152	Kalyāṇa, auspicious; Kaliyāṇar, a pleonastic compound for auspicious/good (Chandrasekaran 2011); sheep/goat, sacrificed before an auspicious event
 575-017  585-017	*eHẓ araṅk- 910 8 *eHẓ ecil 910 808	Saptadvīpa, doabs of the Indus basin; Seven Forts; Ūrdhva-liṅga, raised platform, high city, pleonastic compound (Parpola 1994); Saptapurī, seven holy mythical cities; Ēẓil; also, Durgā, Śāradā
 904-017	*eHẓ yaHṟ 910 5159	Seven Rivers; Sapta Sindhu; Sapta Sāgara

001/002-365/367/368 leaf, petal, sprout *āku/*el-ay	*āk-uM 335/333 *āk-iM 335/333 (refer to Section 6.3)	Oṁ (Parpola 2015, 195-214); Aiṁ; Ām, Āmaṁ (Prakrit)
123	?	*Samudra Manthana?*

6.3. Quasi-Grammatical Markers (Mahadevan 2015)

Indus Glyph	Proto-Dravidian Reconstruction	Meaning and Reasoning
520	*-amp *-(t/tt/c/cc)i/ay *-aHḷ *(t)t-	feminine marker actor/possessor/abstract noun
001 similar to *oH for onef	*-u(M) *-(uc)-u(ṉ/M)	'and'; non-past participle
 060	*-aH *-a(M)	possessive;
002 similar to *ciHr for two	*-i(ṉ/M) *-(ic)-i(ṉ/M)	oblique/possessive/ablative, comparative/ locative; oblique marker that removes final stop in masculine suffix, *-tt- for neuter, doubling of final coronal stops; past participle
 400/401/402	*-(ṅ)(k)k-	dative/instrumental/locative etc.
 740	*-aṉṟ *t-	masculine marker; third person prefix

7. Discussion of Results

7.1. The nature of the Indus glyphs

It seems that in spite of the patterns drawn in this paper, several of these signs occur in repetitive, apocryphal and symmetric ways and styles which appear not to represent sentences or phrases in a language as much as religio-cultural concepts juxtaposed in an aesthetic and mystical manner. This is well in line with what Farmer et al. proposed what the nature of the 'script' was. (Farmer, Sproat, and Witzel 2004, 19-57).

Further, the very large number of possible relations of a glyph, in spite of the usage of rebus, and the very nature of the meanings of these glyphs (primarily religious/mythic) further emphasise this aspect.

7.2. Glimpses into the Political and Social history of the IVC:

The emerging picture from the readings of these signs, if valid, paints a complex picture of the IVC and its relation to the surrounding civilisations, with vast, reverberations in future South Asian mythology and society.

This is by no means a new idea (Asko Parpola's *Roots of Hinduism* is a constant and powerful inspiration to not confuse mythology with history, while simultaneously being on the lookout for what the mythology of a people tells us about them and what they themselves have forgotten about their past), but for the first time there is a potential backing for this in the written record of the Indus peoples (scanty and fragmentary as they are) in case any of these readings are valid at all.

Furthermore, the places where its associations are different from that of later traditions is often highly explicable through known historical movements and interactions between the post-IVC peoples, and gives confidence in the readings by them being as distinct from the later (quite intermixed and often confused) traditions as one would expect from myths separated from the cultural mores that gave rise to them by thousands of years, and subject to random as well as systematic changes.

A vague outline of what tentatively emerges, is as follows (Shinde et al. 2019):

1. The IVC is a multi-ethnic civilisation, and is dynamic and highly variegated through its history. Its apparent uniformity in material culture (though increasingly challenged of late, for instance, the Sorath Harappan and Hakra Ware culture) and script/signs might be due to elite dominance and cultural mimicry rather than assimilation or integration.
2. The apparent greater focus in Harappan infrastructure on public works rather than grand monuments for the elite seems to be at least in part due to the *Gaṇasaṁgha*/oligarchical nature of rule, where the various peoples (or the elite sections of the various peoples) themselves were deified, and also in part due to them lacking a proper script.
3. There is an apparent gradation of wealth from North to South, with the the southernmost coastal regions being considered especially prosperous, and with the later cultures being centered on the migrants from the North, one gets the concept of *Svarga* (the holy and pure, but sparse and poor realms) of above (north) and *Pātāla* (the demonic but extremely prosperous and wealthy realms) of below (south) found in the *Purāṇa*-s, along with the association of *Śiva* with austerity as well as the mountains (and the words for 'northerner' meaning 'impoverished' in Dravidian), and *Viṣṇu* with prosperity as well as the oceans (and his descriptors meaning 'prosperous'). (Bhāgavata Purāṇa, 5.24)
4. The various peoples are:
    a. **weHḷ*: The people originating in the Iranian plateau, and predominant in densely agricultural areas. Related to the *Dāha*-s of Avestan literature, *Dahae*, as well as the *Dāsá* and *dasyú*. They brought in wheat agriculture from the Middle East,

and are associated with the Helmand Culture as well as much earlier Mehrgarh. (Basu et al. 2003) Probably formed the uppermost social group of the IVC for much of its history, and had deep associations with the priesthood. Built dams and other irrigation infrastructure (cf. *Azhi Dahāka*, 'the snake of the *Dāha*' in the Avesta) (destroyed by the **keHy* related migrants who were primarily pastoralists rather than agricultural). Related to the toddy-tapping, mead consuming, as well as landholding-agricultural castes of southern South Asia. They pioneered the use of Bronze, probably.

b. Their names and titles had frequent pejorative associations for the other groups (*Druhyú, Kīkaṭa, Niṣāda, khála, Kaḷḷar, Kaiṭabha, Pulkaśa, Kalabhra, Mūlaka, Aśmaka, Raṭṭa, Koraga*), indicating a high level of disaffection between them and the other groups. Paradoxically, they were assigned very high 'divine powers' (cf. *Koraga*-s today and *Niṣāda*-s in the ancient period, as well as *Vēḷ* meaning 'priest', the *Vēlar*-s of the Sangam period, etc.), along with the often-low social status (*Koraga*-s, B*rahu*i-s). They were almost certainly matrilineal and matrilocal, possibly even matriarchal, as evidenced by *Brahui* and *Koraga* North Dravidian languages unusually correlating with maternal rather than paternal haplogroups, (Sequeira 2024), the agrarian matrilocal castes of South India, and legends of polyandry connected with them. Practised usage of hemispherical burial mounds. (Parpola 2015, 150) (Bronkorst 2007) (They were also involved with the island city, which they helped to create, but were denied?)

c. **coHy/*māl*: AASI, related to the Sorath Harappan culture. (Basu et al. 2003) Numerically, most dominant because their language formed the apparent lingua-franca of the IVC. They often challenged the dominance of the first group. They pioneered occupation of the estuarine and insular regions of Kutch (probably the original *Jambudvīpa, Nāvalampoẓil*, given its shape as well as agricultural use), and possibly the reclamation of the land (although this is also associated with the previous and subsequent group, but perhaps only through later geographical rather than ethnic identifications), oceanic trade (their title is documented in Sumerian '*kinarim*') and settlement of riverine islands. Also provided the agricultural labour for the former group, giving rise to the archetypal pairs of *Kadamba-Pulkaśa*. Highly intermixed, through elite importation, with the early, pre-Vedic Indo-Aryan peoples, and conflicted heavily with the Vedic Aryans, were regarded as Rakṣás or bears/demons by the Vedic peoples. As the Ánu, they were the primary opponents of the *Bharatá-Tr̥tsú Ārya* in the Battle of the Ten Kings. Consumers of *Sóma*.

d. **keHy*: The BMAC and Burusho related group. Also related to the Parni and Paṇí. They were probably the source of tin, lapis lazuli as well as *Sóma* for the IVC. They consumed *Cannabis*. They traded frequently, and invaded often. Repeated invasions by this group, despite large sections that assimilated, must have occurred. Later, Indo-Iranian speaking pastoralists became the elite of these peoples, and they spearheaded the spread of Indo-Aryan to South Asia, spreading a lot of

substrate words of their own languages, as well as their cultural and religious traditions, to South Asia. (Narasimhan et al. 2019) Destroyed the fortresses and water-works of the three main/core peoples of the IVC towards the end. Their myths and legends were heavily incorporated into Vedic beliefs along with that of the **pāṇṭi/*maṟa*, while the others' religious influences were found mainly only in popular Hinduism and not early Vedic beliefs. They frequently imported ivory and ivory artefacts from the IVC and were thus associated with elephants. (Frenez 2018, 13-33)

e. **pāṇṭi/*maṟa*: The people of the highly divergent Hakra culture (Bhirrana), Sothi-Siswal culture and Kunal culture. Related to the *Tuiriia* of Avesta. The 'old people' of the IVC, form the third of the three core groups of the IVC, with **weHḷ* and **coHy*. Overland mercantile, as well as martial group. Formed the intermediate castes and core population and substratum bases in both early Indo-Aryan dominated as well as Vedic-dominated societies. They were the *Turvaśá*-s who fought against the *Bharatá*-s in southern Pakhtunistan (*Hariyūpiyā, Yavyāvatī*). Along with **caHy*, seems to be the focus of later Tantric religious strands. Had square pit-burial practices as visible in Hakra as well as Gandhara Grave culture, which the Vedic Aryans adopted. (Parpola 2015) Due to their pit-dwellings, they probably gave rise to the myths of the prosperous but demonic lands of *Pātāla*. Pioneered *Oryza sativa* var. *indica* cultivation. (Bates, Petrie, and Singh 2017, 193-201)

f. **caHy*: Austroasiatic speaking migrants who arrived towards the end of the IVC, who merged with a *Saka*-substratum related to the *Sairima* of the Avesta(Beckwith 2017) related people from the northwest (*Śambara* fortresses in the Hindu Kush, Sarmatians, who then migrated South-East to form the eastern Indo-Aryans as well as merged with the Austroasiatic migrants, according to cultural memories of the Mundas themselves (Skrefsrud 1873, Introduction,VI Introduction VI) to form the Munda peoples who didn't have a long enough exposure to the rest in a common civilisation to form as strong a part of the South Asian *sprachbund* as the others did and do.

g. They consumed Areca nut. Probably relegated to menial labour and low social stratum (word itself means *Pañcama*, and this is also corroborated by the initially respectable but later degraded profession of the *Paṟaiya*-s), and were the source of the *Śramaṇa* religious traditions, as well as partly the Tantric strands. Introduced *Oryza sativa* var. *japonica* cultivation, or wetland rice cultivation, to South Asia. (Bates, Petrie, and Singh 2017, 193-201)

5. There are a few major axes in how these people were associated with each other, in chronological order:

   a. The three old peoples: As evidenced by the three demons, the triple city and *Saṁkarṣaṇa*-Ekānaṁśa-*Vāsudeva* triplet, the three kingdoms of *Tamiḻakam*. These are the three old peoples (**weHḷ*, **coHy/*māl* and **pāṇṭi/*maṟa*). Of these, the third was considered the oldest (maybe due to the high antiquity of their cities) and the

first the newest (due to their migration from the west). They had conflicts with the BMAC/northern **keHy* people. After the inclusion of the **keHy*, new axes emerge. There is also evidence of repeated conflict between the first two groups for control (*Rāma-Rāvaṇa*, *Kaṁsa-Kṛṣṇa*).

b. There emerges a split between northeast and southwest: **weHḷ* and **coHy/*māl* are paired (*Rāma-Lakṣmaṇa* versus *Bharata-Śatrughna*; *Mitrá-Váruṇa* versus *Índra-Ágni; Śukra-Asura*-s versus *Bṛhaspati-Deva*-s; *Viṣṇu*-Śeṣa and *Rudra-Gaṇa*-s) with a mirrored set of characteristics ascribed in the pairing.

c. After the coming of the **caHy* or the 'fifth' (who formed from an amalgamation of Austroasiatic-Saka speakers from the northwest and east and other peoples from the northwest) who spread the early Indo-Aryan-substrate languages as well as the Afroasiatic language, associations grow complex and fluid, but there is a general tendency of adjacent peoples having shared stereotypes and mythical associations. Further, the **caHy* are very poorly distinguished from the **pāṇṭi/*maṟa*. Here is when the concept of five peoples existing uniquely in their own right crystallises, and is recalled in later legends.

d. The **caHy* are then ejected from the groupings and considered inferior or as outsiders.

e. After the Indo-Aryan migrations from a new wave of the **keHy*, things grow even more complex: the **keHy* originally are firmly the Vedic and the **coHy/*māl* the non-Vedic Aryan substrate, but it soon begins to fluctuate (in the *Brāhmaṇa*-s, *Rúdra* and *Kapila*, successors of *Índra*, become outcaste gods of *Asura*-s whereas *Viṣṇu* becomes a Vedic god and the protector of the *Deva*-s.)

f. There is a fluctuating balance of power between the *Āryá* and the five peoples. The five peoples form a confederacy in the Battle of the Ten Kings, only to be defeated by the newcomer *Bharatá-Tṛtsú*. But the five peoples, especially *Pūrú*, though initially called *mṛdhra-vāc* and barbarian, assimilated into the Vedic religion and culture, to become the Vedic tribe *par excellence*. Later still, the *Pañcāla* tribe made of the five peoples is, along with the *Kuru*, the heartland of Vedic orthopraxy. But the *Kuru* kingdom is invaded by the *Sālva* confederacy of the five peoples, allied with the still non-Vedic *Yadu* (with their practices of cross-cousin marriage, worship of the *Pañca-vīra*-s, and opposition to *Indra* worship), as remembered in the legends of the *Pāṇḍava*-s defeating the *Kaurava*-s, only for them too to later become the pioneers of Vedic orthopraxy.

6. The peoples' linguistic identities/features are probably as follows. (focus of a potential upcoming paper) It is to be noted that the linguistic groups identified below are probably the *lower* and not the *upper* limit on the number of distinct linguistic groups in both IVC and wider South Asia, as well as extensive examples of all such features being present in various branches and stages of Dravidian through borrowing, demonstrating that it indeed must have been a *lingua franca* in the IVC:

a. **weHḷ*: Probably the reason for the perceived minimal relation between Dravidian and Elamite. Words such as upparavar 'bricklayer', and the relict verb-forms found only in highly archaic literary Tamil (*-ku, -kum/-kam, -tum, -ti, pa*) and their claimed cognates in Elamite as well as their lack of persistence or use in later Dravidian, or even early Dravidian except for highly stylised elite poetry, indicate that they could be features of the language of these people. Further examples like the tense markers in a highly divergent language like Koraga (-k- for past and -n- for future), the second person pronoun. (Sequeira 2024) They probably formed the superstrate of Dravidian. McAlpin's Elamo-Dravidian hypothesis was thus probably based on this fragmentary yet compelling correlations, but the relation between these two families was apparently one of admixture and interaction rather than genetic. They would also possibly be the source of words which are distantly related to Iranian, like *khára/gardabha~xara~kaẓutay*, by being the substrate of Indo-Aryan and Iranian *separately*, rather than the substrate of their common ancestor. (Witzel1999, 1–67).

b. **coHy/*māl*: Core Dravidian language speakers, as well as possibly Nihali. Might have been the source of the retroflex consonants of the South Asian Linguistic Area, as well as quotative clitics, non-marking isolating tendencies, agglutination, compound verbs and verbal auxiliaries, postpositions, weakening (voicing/trilling/fricativisation) of intervocalic consonants, vowel length alternation etc.

c. **keHy*: Burushaski as well as BMAC languages, as well as a later association with Sino-Tibetan (due to geographical rather than an ethnic similarity). Source of most of the common words between Indo-Aryan and Iranian that do not exist in other branches of Indo-European. Probably the source of ergative-absolutive agreement in northwestern Indo-Aryan and Eastern Iranian languages. Possessive markers prefixed to relationship words seems to be a feature borrowed from Burushaski to some Dravidian words (cf. *yāy/ñāy/tāy, entai/nuntai/tantai, empi/nampi/tampi,* etc.) Further, the object of a transitive verb can be similarly prefixed to the verb in Burushaski (Anderson 1997), just like it often is in Old Tamil poetry (*yamm-aṇaṅkiy-ōḷ* 'she troubles me' (Zvelebil 1973) 64). (Witzel 1999, 1–67)

d. **pāṇṭi/*maṟa*: Para-Munda/*Kubhā-Vipāś* substrate identified by Michael Witzel. (Witzel 2009) Also possibly Language X of Masica. Source of most of the Punjabi-Hindi substrate words in Indo-Aryan. The Munda peoples were only partly and patrilineally of Austroasiatic genetic heritage, and the Santals have legends of migrating from the northwest rather than the east. Thus, these people are probably also the source of most of the supposed Munda influence in Indo-Aryan and Dravidian, while the Austroasiatic superstrate on their language dates to a migration from South-East Asia that postdates the IVC. They are probably the source of pronominal clitics in western Indo-Aryan (Butt 2007), Brahui and Eastern Iranian (Sogdian, Pashto), and the analogous multiple-agreement system in Munda (features absent from the rest of the Dravidian, Indo-European as well Austroasiatic language families). Modern Dravidian languages possess suffixes to any part of speech, especially verbs, that indicate to addressee (eg. *-ṭā, -ṭī, -ṅka, -mā, -yyā* in Tamil,

-ō masc. *-ē* fem. for imperative verbs and *-ir*i honorific in Kannada, *-aṇḍi* honorific in Telugu, etc.) (Verbeke 2017). Further, during the Aryan migrations, differences between the **keHy* and **pāṇṭi/ *maṟa* substrates or the differences between the **pāṇṭi/ *maṟa* and the **caHy* substrates in the Indo-Iranian languages might have driven the differences of:

i. final *-e* in *Māgadhī* as well as Sogdian vs. Western Iranian/Western IA -o

ii. mutation of s in Iranian as well as Magadhan languages vs. preservation in Western IA

iii. *r* > *l* in *Māgadhī* and *d* > *l* in Eastern Iranian vs. preservation in Western Iranian/Western IA

iv. rounding and backing of *a* in Magadhan languages, as well as Tajik, etc.

The above linguistic tendencies were called *Asura*-n in the *Brāhmaṇa*-s. The *Sākya*-s (peoples of this and the related **caHy* group next) thus may indeed be related to *Saka*-s, but at a greater time-depth than suggested by Beckwith. (Bronkhorst 2007)

e. **caHy*: The chronologically latest entrants in the IVC, towards the end of its lifetime. Austroasiatic migrants who mixed with the *Saka* related group (Skrefsrud1873, Introduction VI) from the northwest, precursors of the Greater Magadhan peoples. (Bronkhorst 2007) Highly divergent from the South Asian linguistic area, by lacking retroflexes (Magadhan languages or Eastern Indo Aryan have poor distinction between the coronal consonants to this day), having classifiers and other features of the East and South-East Asian linguistic area. (Levman 2014, 145–180)

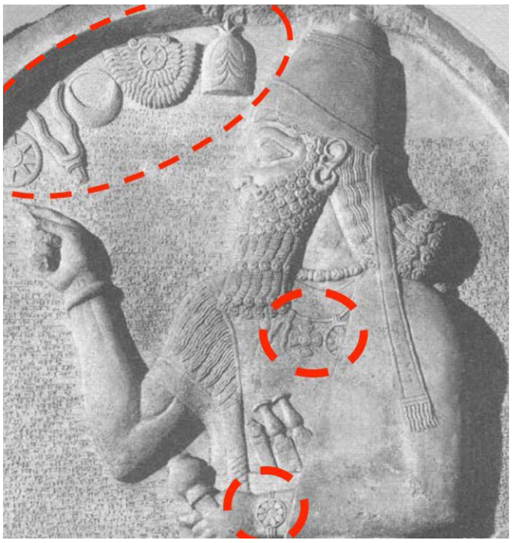


Fig. 8: A stela bearing a five-sign emblematic carrying inscription at temple of Ninurta in Nippur. The symbols represent the gods Ishtar (star), Adad (Lightning), Sin (crescent moon), Shamash (Winged disc) and Ashshur (horned crown). (Farmer, Sproat, and Witzel 2004, 19-57)

7. Further, extremely surprisingly, these five peoples, associated planets and their attributes match *perfectly* with Babylonian mythology, without the aligned association with peoples too, greatly strengthening all the conclusions found in this paper and raising intriguing questions about the origin and spread of these myths (Green 1992) (Holland 2009):
    a. *Inanna's* Venusian (**weHḷ*) association, and further association with fertility, ownership of land etc. as well as law and justice. Identified with Semitic *Ishtar*. (Pryke 2017)
    b. *Ninurta's* Saturn (**māy*) association, and association with agricultural labour, hunting, conquest, bird insignia, mace weapon, discus etc., and especially scribes and messengers. Related to solar *Shamash*. (Robson 2015)
    c. *Nergal's* Martian (**keHy*) association, and association with the bow, war, infliction of disease, as well as the patron god of accountants. Related to lunar Sin. (Wiggermann 1998, 222)
    d. *Marduk's* Jovian (**poṉ*) association, and association with spade, trade and war. *Enlil*, whom he replaces as the king of the pantheon, has further relevant associations with wind, lightning and thunder. Related to *Ishkur* and *Adad*. (Coleman 2015, 108)
    e. And by far the most intriguing, *Nabu's* Mercurial (**pac*) association, with his royal father as *Ninurta* but biological association with the moon, just like Budha, and his name itself meaning to 'announce' or 'proclaim' just like one of the meanings of (**caH*) , and similarly lacks associations of sacred animals or symbols, lending weight to hypotheses that this myth might have been borrowed wholesale from Babylon to describe the fifth and latest people of the IVC. (Bertman 2005, 122)

7.3. Implications for the history of *Varṇa* and *Jāti* in South Asia:

It is tentatively borne out that, possibly, the Indus Civilisation and Polity/Polities were administered through an oligarchy defined by reserved representation for the five primary ethnic groups. This can be connected to the perceived egalitarian nature of the Indus Cities, as whoever be the dominant class in any given city, the other classes must also be given space (cf. *Pañcāyatana Pūjā*), including a form of horizontal division of labour amongst the five groups. (Reitze 1998) (Reitze 2005, 105-112)

This oligarchical and republican rule is the origin of the Panchayat traditions and traditions of veneration to multiple deities, and also the Vedic *vidátha*-s, and the Sangam *kaẓakam*-s and Buddhist period Saṁgha, along with the fact that the vast majority of cis-Indus Iron Age polities were Republican (*gaṇarājya*-s), along with a mix of *rājya*-s and *rājaśabdopajīvin*-s.

This originated from the fact that the Indus Civilisation was multi-ethnic, as, as usual, immigrants could not overwhelm the existing population due to the existing population being colossal. Thus, the people who introduced agriculture from the west (Mehrgarh) got incorporated as one of the five peoples.

This system later was subverted, and the existing hierarchical tendencies exacerbated, due to merging with the social hierarchies of the Ārya-s and their overwhelmingly vertical division, and this phenomenon of innumerable endogamous classes solidified around the early first millennium CE.

7.4. Connections with later epigraphy:

Tamil Brahmi, in its earliest stages, as it co-occurs with Megalithic graffiti, is written in a manner full of redundance and overrepresentation of sounds, extremely similar to how phonetic Cuneiform that evolved from the originally purely logographic and ideographic Cuneiform. (Mahadevan 2014)

This suggests that the style that the ancient Tamils adopted in writing Tamil Brahmi demonstrates a possibility of them having been using a putative deficient syllabic script, possibly the Megalithic Graffiti symbols that evolved from the Indus Signs' secondary phonetic nature, after the collapse of the Indus Civilisation and the accompanying putative elite suppression of evolution of a script (Farmer, Sproat, and Witzel 2004, 19-57), before and during the shift to Brahmi. (Lal 1960, 4–24)

Furthermore, this can, in conjunction with Tamil poetry (where vowel length obviously does not mean the same thing as it does in Sanskrit) indicate length contrast in Dravidian might have been more flexible, with a greater focus on beat-patterns being retained rather than fidelity to any fixed notions of vowel length. Dravidian vowel length is a combination of two phenomena in Proto-Dravidian: inclusion of a length-flexible **H (āytam)*, or actual variation of vowel length, making Dravidian prosody and stress complex.

8. Concluding Comments

The most fascinating part of the process, for me, has been the fact that most of my findings were a surprise to me. Beginning, to gain a familiarity with the Indus Sign sequences, with a presumption of an Indo-Aryan reading (having also favoured OIT in the early stages of my deep-dive into South Asian history), the journey where the evidence and further reading, rather than preexisting ideas, guiding me to a Dravidian reading, and then slowly realising that there might be multiple languages and ethnicities in play, in line with Witzel's dichotomy between the Red and Black divinities as well as the Bull and Panther divinities (while still finding Witzel's *Kubhā-Vipāś* hypothesis unsatisfying, and sticking to Dravidian etymologies for the words he identified), then subsequently finding that these various pairs were not restricted to the identities of a simple binary, and then later my Dravidian readings themselves, in conjunction with later literary evidence, revealing the existence of a ethnolinguistic group identified in the Indus Texts whose characteristics and geographical distribution bear and uncanny and irresistible similarity to the putative people of the Para-Munda substrate.

This example can be greatly multiplied (for instance, even the instrument *Rāvaṇahattha* being similar to the *Kinnāram*, and the sign I identified for it (in a complex route starting with the graffiti marks found on a spindle discovered in IVC) appearing visually as the *arm*, of the person

who I had identified, for other reasons, with *Rāvaṇa*!), given nearly every single element in the results was of some degree of surprise to me, revealing it to myself in a slow and punctuated process of connecting with existing knowledge and newly discovered facts, more than the ideas I had till that point.

The most surprising aspect was the continual experience of evidence agreeing with my existing hunches in the places I least expected (like the Mesopotamian myths) accompanied by the much more frequent incidence of new information overturning or entirely refuting many ideas I had.

The verification of these readings through a statistical, chronological and geographical analysis of the distribution of the Indus Seals is a desideratum, but it is to be kept in mind that the location alone cannot simplistically determine the ethnic identity of the person(s) alluded to in them, given that the IVC was a highly mercantile and cosmopolitan civilisation. The work herein has been primarily of a qualitative rather than quantitative or statistical nature, and the deficiency is acknowledged as ***serious enough to make all these findings highly tentative***. I would claim no decipherment of any section or part of a putative Indus 'Script', rather, this is an attempt to linguistically correlate and unravel the plausible ideographic underpinnings of some of the glyphs. An earlier version of the paper contained extensive (but poorly attested and supported) numerical, astronomical, geographical, mercantile and grammatical 'readings' of many more glyphs, but a potential work of that kind must be of much greater rigor and vastly lower reach, focusing on individual glyphs rather than finding patterns across large numbers of glyphs and thus reducing the bandwidth of analysis possible on each individual glyph (although the verification with M77, ICIT, DEDR, CDIAL and other papers has been systematic and painstaking, it does leave rigor to be desired; this paper has been volume at the cost of rigor), and those were thus excluded from the paper.

Further, many of the individual steps (checking for rebus possibilities through DEDR, or glyph occurrences in ICIT, for instance), can be computer-automated to a large extent to make the process much more powerful and accurate. Word embeddings, modified to apply to a symbolic pseudo-script and focusing on mythical and cultural correlations rather than specifically linguistic underpinnings, can also be used to capture patterns in semantics and attain a more vivid understanding of the sign system. This paper can be a potential first step towards that, as till now the deficiency of data was one of a lack of understanding of even a handful of glyphs in the Indus Sign assemblage. I hope to pursue these leads in further research on these lines.

Remarkably, there is a seal with the three animals that have been identified in this paper as totemicanimals of the **weHḷ*, **māl* and **pāṇṭi*, the three old peoples of the IVC, which is a possible ancient reflex of the *Saṁkarṣaṇa*-Ekānaṁśā-*Vāsudeva* triplet.

Fig. 9: Unicorn, buffalo and fish seal: National Museum, Delhi

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IVC Deep Astronomy
Harappan Celestial Omens List

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Premise

We build on Asko Parpola & Iravatham Mahadevan's extensive works to show that a substantial portion of the IVC seals was a Celestial Omens List with the planet Venus occupying a central role in their astronomy. We show the full decipherment of 75 inscriptions and a partial decipherment of 61 inscriptions forming approximately 5% of the total # of inscriptions. The key aspects of our findings are given below:

I. Antiquity of Harappan Astronomy

1. Proof of Mahadevan's hypothesis (1972) that in the absence of a Rosetta Stone/Behistun Inscription, we can still decipher the IVC using bilingual parallels. We used bilingual parallels to build out the complete sign set for the 5 visible planets (Mercury, Venus, Mars, Jupiter, Saturn) and the Lunar Nodes (*Rahu-Ketu*), Solstices & Equinoxes. Signs for Mercury, Venus & Saturn were already identified by Parpola (1994).
2. The deep astronomical knowledge of the Harappans, which predates the Babylonians by several hundred years at least. The Harappans were the originators of the Zodiac & Nakshatra system that is still followed. Harappans knew about the Saros Cycle, Metonic Cycle, Epicyclical Model of the Planets, Lunar Nodes & their role in eclipses, long before the Babylonians & Greeks, who are thought to have originated these.
3. Used Archaeoastronomy methods to construct a prototypical Harappan Celestial Omens list showing the probable actual dates of these astronomical events tracked by the Harappans.

II. Harappan Celestial Omens

1. Full decipherment of the *Swastika*, one of the most widely propagated symbols of humankind, which has defied our understanding so far.
2. Identifying the signs for good and bad omens.

3. Full decipherment of the tablet H-182 (Parpola 1994, Fig 13.3 provided as Fig 1 below), denotes the Venus Octennial celebration or festival that was held once every 8 years.
4. Full decipherment of the first ever IVC seal discovered Seal # 5084 (IM77) [Fig 1], Intaglio seal H97- 3433/7617-01 dated to approx 2,200 BCE [Fig 1], Harappan seal H-9 which has just the signs for "7" and fish [Fig 1], IM77 # 4171 which has just the signs for "6" & fish [Fig 1].
5. Decipherment of a substantial subset of inscriptions (136 out of 4,000+) from what would have been an elaborate Harappan Celestial Omens list, which we estimate to be 1,740.

III. Harappan Meteorology

How the Harappans may have used their Venusian astronomy & animal watching (Cobras specifically) skills to predict rainfall. Traces of the animal watching methodology still visible in tribal traditions. Traces of Venusian meteorology can be seen in the Sangam literature.

IV. Harappan Ritual & Temple Culture

The actual ritualistic function of the Great Bath Complex in Mohenjodaro, which solves another long-standing puzzle in the IVC research community, and that the Great Bath Complex contained the Temple for the Moon & the 27 Nakshatras & the Temple of Venus.

* Sukumar Rajagopal is an independent researcher. An earlier version of this same paper was presented by Sukumar at the Padmashri Iravatham Mahadevan Memorial Seminar organized by Tamilnadu Archaeology Department in March 2022. Please contact Sukumar regarding this paper at rsukumar@gmail.com.

Fig. 1: (L to R) - H-182, H97-3433/7617-01, First ever seal discovered "Cunningham Seal", H-9, IM77 # 4171

Introduction

The Indus Valley Civilization (IVC), a bronze age civilization, is renowned for its urban planning, manufacturing capabilities and trade networks. Yet, its seminal contributions to astronomy remain unknown due to the IVC script being undeciphered so far.

This paper aims to cover 9 major aspects:

A. Key challenges and difficulties in the decipherment efforts.

B. Revisit Parpola's hypotheses about the Harappan fish signs he has attributed to planets and asterisms.

C. Revisit Mahadevan's (1972) theory of bilingual parallels, enabling us to apply it more effectively to decipher parts of the IVC script.

D. Propose decipherment of the *Swastika* symbol and the tablet H-182, which has 5 *Swastika* symbols, one of the most widely propagated symbols of humankind, which has defied our understanding so far.

E. Prove the sophistication of Harappan astronomy and show that it not only predates Babylonian and Greek astronomies but also influenced Babylonian, Greek and later Indian astronomical systems.

F. Provide evidence for the Harappan astronomical model for celestial omens.

G. Provide decipherments of key inscriptions using the proposed celestial omens model to demonstrate its efficacy

H. Provide evidence to show the hithertofore unknown function of the Great Bath and the broader religious Complex that it was a part of in Mohenjodaro.

I. Use archaeoastronomical techniques to show the actual dates of the celestial events that were tracked by the Harappans.

A. Key challenges and difficulties in the decipherment efforts

One of the biggest stumbling blocks in the decipherment initiative is that it is very difficult to imagine the kind of subject matter that could be communicated in such extremely brief inscriptions, which have an average inscription length of just 4.6.

What compounds this problem further is the fact that approximately 14% of the 4,000+ total number of inscriptions are one-sign, two-sign, three-sign inscriptions, 64, 220 & 269 inscriptions respectively [the list is provided in Annexure A]. In fact, most of the past decipherment efforts fail because of the presence of these ultra brief inscriptions. Fitting the decipherment of one-sign inscription into one-sign context and the multi-sign context is very hard to do.

For example, the fish sign #59 occurs as a single sign on a seal. If we hypothesize that it represents a certain quantity of fish being sold/traded, then we should find inscriptions that correspond to varying quantities of fish being sold/traded. The only numeric signs that accompanies the fish sign are one, two, three, four, five, six, seven and twelve, which means eight/nine/ten/eleven quantities of fishes were never sold/traded?

Interestingly in IM77, there are signs for one through twelve but no eleven. To complicate matters further, the signs for one, two, three, four, five, six, nine and ten, occur also in single sign inscriptions in the corpus. What would that have connoted? Any numerical explanation like a number list or a quantity indicator, has to account for why we don't find the sign for seven, eight and twelve appear as a single sign. What about numbers beyond twelve? It is inconceivable that they didn't deal in quantities beyond twelve.

All these problems point to the idea that they are representing information that has very high contextual meaning, where just one sign can convey the entire idea. Assuming such a high context content, two to four signs can convey complex ideas easily.

This is why the central idea of this paper, that a subset of Indus inscriptions could be a celestial omen list, is very attractive to solve this vexing problem of brief and ultra-brief inscriptions. The high-context nature of the celestial omens, lend themselves to be communicated in a succinct way.

We can look to the Near East for inspiration. The IVC had extensive trade relations with the Near East. Scholarly consensus exists that the term *Meluhha* used by the Mesopotamians refers to the IVC. The Babylonians maintained several omen lists and these omens were succinct and had an If-P-then-Q type of construct (Rochberg 2010). One example of the Babylonian If-P-then-Q type of omens is "if Jupiter is steady in the morning, enemy kings will be reconciled". We will show later that the idea of celestial omens originated in the IVC and later got transmitted to Babylon.

In Indian tradition, ancient text Varahamihira's Brihatsamhita (1884 translation) has an extensive compilation of various types of omen lists. One example of a Venus omen from the Brihatsamhita – "If Venus should pass through the constellation of *Krittika*, the Earth will be so much inundated with water as to make its surface even". The If-P-Then-Q type of construct is evident, and it is succinct. In later Indian tradition, we have the almanac (Fuller 1980) that has a succinct format in a 5-part structure (Vahia 2011) resembling the If P then Q structure. Though the printed almanac is probably less than 200 years old, the names of the constellations still in use can be traced back to 1500 BCE (Burgess 1866). We will show later in this paper that the Nakshatra system as well as the Solar Zodiac system is even older, dating to the Early Harappan/Mature Harappan period. To be clear, we are using the modern almanac only as an example of how a celestial omen could be described succinctly. We are not arguing that the modern almanac is a continuous tradition dating back to the Harappan period.

The 5 parts (Vahia 2011) of a modern Indian almanac entry are: 1. solar marker, 2. lunar day, 3. lunar asterism, 4. *Yogam* (astrological concept) and 5. *Karanam* (astrological concept). Along with the 5 parts, a few words to denote specific named festivals or ritual days are added. The 5 parts forming the If-P-then- Q structure reminiscent of Babylonian omens (Rochberg 2010). For example, for the new year day, the almanac mentions a couple of words that mean "new year day" after the 5-part structure. Through their contextual knowledge, Hindus already know the rituals they are supposed to perform, which need not be elaborated upon in the almanac.

This method can help explain how the Harappan inscription may have conveyed the complex subject matter of H-182 or #5084 using just a few signs following the If P Then Q structure.

Almanac makers across the world achieve similar levels of brevity. For example, the Farmers Almanac (1850) from Philadelphia uses a similar succinct construct—one entry for each day with day of the week, moon rise, moon set, moon in zodiac, sun rise, sun set and one or two word description for the day.

In the same manner, IVC inscriptions need not detail out the exact rituals/festivals to be performed. Our research shows that 1,760 inscriptions out of 4,000+ inscriptions are celestial in nature. The remainder inscriptions could be covering some other high context subject matter.

B. Revisit Parpola's hypotheses about the Harappan fish signs

Father Heras (1953) originally proposed that the Fish symbol in the Indus corpus represents astral divinities. Parpola (1994) developed that hypothesis further with elaborate research to identify the symbols for Venus, Mercury, Saturn, Pleaides, Ursa Major, Pole Star, *Rohini* (Aldebaran), making the astronomical nature of some of the Indus inscriptions highly plausible.

Parpola (2013) has done a detailed refutation of Pingree's position that the Indian system is derived from Mesopotamia. Parpola (2013) goes on to show that the Harappans devised the Nakshatra system in the Early Harappan period (3300-2600 BCE). Further, Burgess (1866) gave a detailed explanation of why the Nakshatra system is indigenous to India and he dates it to 1500BCE.

We conducted additional research on Parpola's fish sign findings. Parpola (1994, p. 231) shows how, once upon a time the word *VeLLi,* which means Venus, once stood for all the stars in the night sky. Given the pivotal role for Venus we have found in the Harappan astronomy, the first one we focused on was Venus. We analyzed the 3 candidate languages for the IVC to determine which ones can connect the 2-lines symbol to Venus:

1. Gap is *VeLi* in Dravidian. It is an approximate homophone (sounds a lot like) of *VeLLi*, which means Silver in Dravidian. Also, Venus has another Old Tamil name (*Vidi VeLLi*), which can be loosely translated to Morning Silver. Further, the 2 lines can be interpreted as Iru *Meen*, which is simply double (Iru = Two) star because it is both an evening and morning star.
2. Or by applying the Two is Great (*Iru* = Great) symbology (Sukumar 2020), one can say Venus is the Great Star, because Venus is the brightest object in the sky after the sun and the moon. Additionally, as we show later in this paper, the 2 lines can also be interpreted as representing the 2 halves of the Venusian 19-month synodian period.
3. Also, the 2 lines represents the number 2 because it is the 2nd planet in the 5 planets that are visible to the naked eye (Mercury, Venus, Mars, Jupiter, Saturn).
4. Therefore, the two lines with a gap in between, interpreted as Venus (Parpola 1994), can be done using Dravidian as the language in multiple ways, making Dravidian the best fit for this rebus.
5. In Sanskrit – Venus is called *Śukra*, which is probably derived from *Śukla,* which means white. However, the word for gap in Sanskrit is *antara* which cannot help us reach the

Sanskrit word for Venus. If we look at the broader Indo Aryan languages using RL Turner's Comparative Dictionary of Indo Aryan Languages (CDIAL), we find 61 entries which have the word "space" in their meaning and 10 entries which have the word "gap" in their meaning. None of them fit the Venus rebus. Therefore, using bilingual parallels, *Shukla* is likely a calque of the *ven-min* (white star) which morphed in to *Shukra* through L R rhotacism, a well attested linguistic phenomenon.

6. For Munda, we analyzed Campbell's Santali English Dictionary, which has 5 entries with the meaning "gap" and 25 entries with the meaning "space" in them. None of them fit the Venus rebus.
7. Parpola (1994) has 3 full chapters covering the Astral religion, as he calls it, of the Harappans. We have researched and summarized Parpola's fish sign findings choosing only those findings that are relevant to this paper in Table 1 below.

C. Revisit Mahadevan's (1972) theory of Bilingual Parallels

Mahadevan (1972) covers an interesting approach to the decipherment of the Indus Script which he called Bilingual Parallels and shows how Dravidian loan words go to Indo-European (IE) and make the round trip back to Dravidian in a new form which may not any longer resemble the original.

Important quote from Mahadevan (1972)

> *14. In spite of these uncertainties and limitations, which I have deliberately emphasised here, the method of bi-lingual parallels would seem to be the only one available at present for at least a partial understanding of the context of the Harappan texts. The discrepant traditions themselves can provide valuable clues. I feel that, in favourable circumstances and interpreted with due care and circumspection , bi-lingual parallels based on concrete Harappan signs, can be virtually as good as bi-lingual inscriptions.*

The idea of Bilingual Parallels from Mahadevan, has not received adequate attention from the IVC research community for 50+ years [Recently, Manikanda Subbu & Dhanapal S. have written an article covering the Bilingual Parallels approach in the September 2024 issue of the *Tamizh Thadam magazine*].

It is a breakthrough idea that could obviate the need for a Rosetta Stone/Behistun Inscription to decipher the IVC script. IM's observation can be equated to the well-understood/well-attested contact linguistic phenomenon of Loan Words, Loan Translations & Calquing. IM's specific observation would be Round Tripped Calquing/Loan Words/Loan Translations - once from Dravidian to IE and then back to Dravidian from IE in a new form.

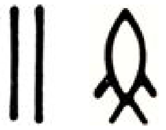
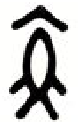
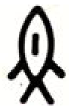
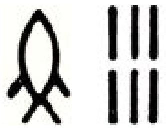
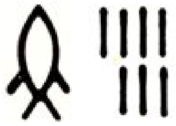
Planet/Asterism	Signs	Parpola (1994)'s findings & our commentary
Mercury	Sign 72	Parpola reasons that the slash mark represents dividing/halving and connects it to Old Tamil pagu-min (dividing fish)/ pasu-min (green fish). Parpola goes further to connect the green color to the emerald color of Mercury used in the later nava-graha tradition.
Venus	 Sign 87, 59	Parpola has identified the fish plus two vertical strokes as Venus. He uses the rebus principle to show the Old Tamil name for Venus white star/silver star ven-min/vel-min. That Sign #87 is an allograph of Sign #59 + Sign #87 is Parpola's finding.
Saturn	 Sign 65	Saturn as roof fish Sign #65 is Parpola's finding. Parpola shows that it is mai-meen (black one) or vai-meen (roofed one) and the connection to tortoise, which can be thought of as a roofed-fish, and which is slow moving. In Sanskrit, Saturn is Shani the slow one. Old Tamil also uses Sani the old moniker has been lost. Mai-meen is referred in Sangam literature.
Rohini	 Sign 70	Parpola (1994) provides elaborate arguments to show that Sign #70 is Rohini. We disagree. The dot in the fish can be thought of as Karu which can mean foetus or black in Tamil. Fishes carry their eggs (foetuses) in their belly. Also eclipses bring darkness (black Karu). Hence this symbol is the Ascending Lunar Node Rahu.
Pleaides/ Krittika	 Sign 59, 109	Parpola (1994 p 194) has shown this frequent sign sequence of fish and six as Krittika (Pleiades) which is called āru meen in Old Tamil, literally six fishes. We agree with this identification, but what is the meaning of an inscription just having this sign sequence? Parpola has not explained that.
Great Bear/ Saptarishi	 Sign 59, 112	Parpola (1994 p195) has derived this to be the Old Tamil elu meen literally seven fishes and that is the Saptarishi or Great Bear. Again Parpola has not explained what is the meaning of an inscription which has this sign sequence. We show later that this elu meen refers to the constellation of Orion, and that this sequence is associated with an important festival still celebrated today. Through the later day amalgamation with the Vedic people, elu meen got assigned to Great Bear.
Mriga Sirsha	Sign 59, 89	Parpola (1994 p194) derives this to be mu-m-meen , the Old Tamil name of Mriga Sirsha (it is in the Orion constellation). We disagree. We later show that this Fish + Three sequence represents planet Mars.

Table 1

Loan Words, Loan Translations & Calquing

These are a common phenomena that happen when multiple cultures speaking different languages start interacting or commingling with each other. When a culture encounters a new concept that doesn't exist in their own language, they incorporate the concept as a loanword or a loan translation or through calquing.

Most of the world's languages have some form of loan word, loan translation or calquing within them. However, in this discussion, we will stick to examples in English and then connect it to IM's Bilingual Parallels and show how useful it can be.

Loan Word - The word Kangaroo is a famous example of a loanword. Since the animal doesn't exist in any other geography besides Australia, the Australian word Kangaroo (which by itself is a loanword from the Aborigines) has been adopted into most of the world's languages as-is.

Loan Translation – When Skyscrapers came up new in building construction, many of the world's languages suddenly needed a new word. Most of them just did a literal loan translation of the word Sky & Scraper. For example, French call it "*Gratte-ciel*" – Literally Scrape in French followed by Sky in French.

Calquing - Calquing is a more complex phenomenon because there is no standard way in which cultures borrow words and concepts from other languages and cultures. To simplify, we can say Calquing is a more complex form of Loan Translation.

Some illustrative examples:

1. The decidedly American fast food "Hot Dog" was originally called *Wiener Würstchen in Germany*, where it was a popular sausage food. When this food came along with the immigrant Germans to the USA, they called it Dachshund because of how it looked and it soon became "Hot Dog" because Dachshund is a dog breed.

2. Today, the word Baguette in English, is a long thin bread a bit hard on the outside. It is originally French, where it means a long thin rod/wand/baton. The French word for Magic Wand is Baguette Magique & Chopsticks in French is *Baguette Chinoises.* This clearly shows how the semantic scope has narrowed in English from the original in French.

3. The word Séance means a session in a paranormal setting. The original word from French means any session. Again, the semantic scope has narrowed in English.

4. Today, the word Gymnasium or Gym for short, is a place where one gets a workout. Interestingly in German, the same word Gymnasium means a school where children study. If we dig deeper, we find that the word Gymnasium originates from Greek, where it has the meaning of both a workout place and a school. This is because in Greece, people got both their education and workouts done at the Gymnasium. Germans took the school part of the meaning into their language and the English took the workout part of the meaning into their language.

5. Tea, which originally came from China, obviously needed new words in all the world's languages. Interestingly, in China, there were 2 words for Tea in China – *Tay & Cha*. The

cultures that got acquainted with Tea through the Silk Road – a land route, adapted *Cha* into their respective languages as *Chai* (*Hindi*), *Chea* (*Nepali*), and the ones that adopted the drink through the Sea route went with Tay and made it into *Tea* (*English*) etc.

6. *Naan* is a type of bread in North India. And it is called "Naan Bread" in English because they already have regular Bread and they need to distinguish Naan Bread from regular bread. There are many examples of these duplicates or tautologies, which get created through Calquing.

Some illustrative examples that are due to mistakes in the Calquing process:

1. Jerusalem Artichoke (Thompson 2017) – it is an Native American tuber and is neither from Jerusalem nor is it an artichoke. The Italian immigrants who encountered it called it *gerasole* – the italian word for sunflower, because the flowers resemble sunflower. The French explorer Samuel de *Cha*mplain noted that it tasted like artichokes and sent it back to France, and the name Jerusalem Artichoke stuck.
2. Shampoo (Mayer 2023) – it has its origins in the Hindi word *Champna,* which means to press/massage. A British Officer working in India in 1762 wrote a report describing his full body massage using the word Shampoo to describe the whole process. Over time, it got narrowed to the current meaning of hair cleaning.
3. Quarantine (Mayer 2023) – Ships arriving in Venice during medieval times were kept on observation for 40 days to detect the presence of plague. 40 days in Italian is *quaranta giorni*. Easy to see how that was absorbed into English as Quarantine.
4. *Kê-tsiap* (Hokkien Chinese) – is a type of fermented fish sauce used in Southeast Asia. British traders brought it to Europe and it evolved into the word Ketchup we now know and is typically made of Tomato.
5. Jackfruit in English is from *Chakka Pazham* in Malayalam. Chakka, which has a specific meaning made into the English sounding Jack without regard to the original meaning and *Pazham,* made into Fruit which is semantically accurate.
6. Mango in English is *Mankaai* in *Tamil/Malayalam,* copied as is without regard to its meaning and the ending anglicized.

Applying Loan Words, Loan Translations, Calquing in the IVC Context

Let us apply the principles described in the previous sections to the planetary symbols used by the Harappans. This builds on Asko Parpola's findings as well.

Hindus are the only culture that has a mythology where the Demons and Gods have teachers as the planets Venus and Jupiter respectively. The bilingual parallels approach gives us a plausible explanation on how such a mythology got developed.

One of the Old Tamil words for Venus is *VaikuRu Meen,* which connotes an early morning star. The word *VaikuRu*, when uttered orally by Dravidians, the syllable *ku* sounds like *gu,* making the last part of the word resemble *guru*, which is a homophone of the Sanskrit word Guru which

means Teacher. Since *VaikuRu* represented Venus and the Harappan astronomy-based system is ostensibly guided by the Venus cycle from the viewpoint of the Vedic people, it was perhaps easy for the Vedic people to conclude that Venus is the teacher of the Harappans. In Vedic mythology, Venus came to be known as *Shukracharya* – male, which is another change from the female Venus of the Harappans. *Śukra* is the Sanskrit word for Venus and Acharya being another word for Teacher in Sanskrit.

In Vedic Mythology, *Shukracharya* is the famous teacher of the *Asuras* (Vedic term for demons). Extending the calque from that, Jupiter was made the teacher of the *Devas* (Vedic term for gods). Jupiter is still called *Guru* in Sanskrit and Tamil.

Planet Mercury

We have covered Parpola's derivation of Sign 72 as Mercury in a previous section. Our research into Harappan astronomy shows that Parpola's derivation misses a key aspect of Mercury which could provide another important evidence of the advanced astronomical skills of the Harappans. Here again, only in Hinduism is Mercury known as the Wise one. Greek and Roman mythologies call Mercury as the messenger due to its fast orbit.

Harappans had calculated the epicyclic period of Venus as 228 and Mercury epicyclic period is 116, which is approximately half of Venus, thereby the fish is cut in half with a slash mark.

Our research also shows that there is another indicator for the Mercury = Half Venus depiction. Sign #93 (Fig 2) which uses a Slash with the Sign #87 (#87 in Table 1 is an allograph for the Venus). Mercury is *Budhan* in Sanskrit and borrowed as is into Tamil. Sign #93 which can be translated to *Arai-Velli* [Half Venus] which may have been the Old Tamil name which has been lost. Applying bilingual parallels, *Arai-Velli* sounds like *ArivALi* (means knowledgeable) and that got calqued to *Budhan,* the Sanskrit word for Mercury.

Fig. 2: Sign 72, 93

Planet Mars

Mars is the third planet and hence the Three. (Sign #89). In Sanskrit, Mars is *Mangal* which means auspicious. Interestingly, having Mars in the birth chart is inauspicious (*Mangala Dosha*). The reason for this dissonance could be from the Old Tamil word for Mars – *Sevvaai* (loosely translated to Red). Red denotes Auspicious in Old Tamil tradition, which got translated to *Mangal*. Tamil retained the name *Sevvaai* thereby giving us the key evidence of the bilingual parallels method based on how the name got mis-calqued. We have already shown how Jupiter may have gotten the name *Guru*.

Interestingly, for Jupiter and Mars, the Old Tamil names are still in use – *VyaLan* & *Sevvaai* respectively. Whereas, for Mercury, Saturn and the Lunar Nodes, the Sanskrit names – *Budhan*, Shani & *Rahu* have been borrowed.

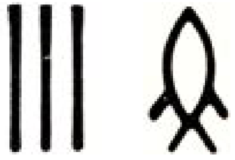


Fig. 3: Sign 89, 59

The Curious Case of *Ashta Vakra*

In Tamil astrology, the prograde transit of a planet is called *Peyarcci,* whereas the retrograde transit of a planet is called *Vakra Peyarcci,* where *Vakra* is a borrowing from Sanskrit which means crooked or twisted.

Parpola (1994, p. 233) assigns the meaning of seizing star to *Kon Min* and quotes Cirupanaattrupatai verse 242. We disagree. The verse merely states that the sky is surrounded by the *Kon Min*. That verse can be better interpreted as planets that cover the entire sky (because of their crooked trajectories). Also, *Kon* has a DEDR entry, DEDR 2209 Ta. kōṇ means crooked. DEDR does not record Seizing as the meaning for this word. We believe that this usage is due to the crooked trajectories of these planets the Harppans were observing and plotting carefully. That also means that they knew that the planets were orbiting something else, which is the epicyclical model of the Geocentric viewpoint.

Coming back to *Ashta Vakra*, in another application of Bilingual Parallels, there is a famous sage, *Ashta Vakra* referenced in the Puranas [*Ashtavakra* is referenced in verse 6.119.17 of Yuddha Kāṇḍa in Vālmikī's Rāmāyaṇa] *Ashta Vakra* so called because he had eight deformities in his body. That name got calqued into Tamil as AshtaKona. Therefore, *Vakra* = *Kona* [DEDR 2209 Ta. kōṇ means crooked]. Now applying bilingual parallels, the original name for retrograde transit would have been *Kona Peyarcci*.

D. Proposed Decipherment of *Swastika* symbol & Tablet H-182

H-182 Tablet from Harappa [Fig 1 above] [IM77 #4306] is an interesting object as it has 2 sides A & B. Reading right to left per the well-accepted IVC convention:

1. On side A, we have a tiger, a drummer and a 3 sign sequence - 2, intersecting circles [IM77 Sign #403], 2 vertical lines [IM77 Sign #87] and the famous Jar symbol[IM77 Sign #342] which is the most frequently used ending sign across the IVC corpus.
2. On side B, the inscription starts with the same 3-sign sequence from side A - 2 intersecting circles, 2 vertical strokes and the Jar symbol - and ends most interestingly with 5 *Swastika* symbols [IM77 Sign #148]. Close examination reveals that the *Swastika*s are not identical

but alternate between the right turning and left turning versions. Interestingly, IM77 has only one sign (#148) that covers both the right-turning and left-turning versions of the *Swastika*.

Summary of this tablet – It represents the Venus Octennial Festival that was celebrated once in 8 years when Venus returns to the Leo Constellation alongside the Sun and the Moon is in Aquarius (*Danishta Asterism*).

An in-depth analysis of various components of this seal follows:

Swastika [IM77 #148]

What is the meaning behind the actual shape of the *Swastika*? And why did they use 5 *Swastika* symbols and that too, both the right-turning and left-turning ones in the same inscription? Because both versions are in the same inscription, it clearly rules out scribal error.

We will show that there is a fascinating amount of Venusian astronomy behind these 5 *Swastika*s and that it adequately sets up the astronomical context of this unique tablet. This astronomical context is crucial to interpret the other signs on this tablet accurately.

When we look at one cycle of Venus closely, it has the following peculiarities:

- Venus is both a morning star and an evening star.
- One synodian Venus period is approx 19 months (584 days).
- Each synodian period can be split into 2 equal halves with Venus appearing as a morning star in one half and as an evening star in the other half. Each half when Venus is visible in the sky is 9 months each (totaling approx 540 days across both halves).
- Both the morning star and evening star halves end in an invisible period totaling approx 44 days.
- Interestingly, the 9 months is also the gestation period for human births and hence gives Venus additional importance in the fertility-oriented Bronze Age society of Harappa.

Venus returns to the same point in the sky (plus/minus 2 degrees) after 5 synodian periods. After every synodian period, Venus changes course assuming a geocentric viewpoint from prograde to retrograde and vice versa. This cycle of five alternating 19-month synodic periods gets completed in 8 years.

Astronomer Tunc Tezel (Tezel 2005) published a picture on the NASA website which shows Venus tracing an S shape (can be seen as a snake with some imagination) as shown in Fig 4 below.

We used the open-source software GIMP and created a flipped copy of the S shape above (to represent the second 9-month Venus period) and overlaid it to create Figure 5 below. The shape in Figure 5 can quite easily be connected to the distinctive shape of the *Swastika* (2 snakes). The snake symbology of the *Swastika* is covered in a later section.

We take the first *Swastika* symbol (right turning) to represent one full 19-month synodian period of Venus and the 2 halves of the *Swastika* to represent the two 9-month halves of one

Venus synodian period. When one synodian period ends, Venus changes course from prograde to retrograde, the second left-turning *Swastika* symbol represents that. Similarly, as Venus traverses all the 12 zodiacs over 8 years and appears in the same point in the sky, it alternates every synodic period from right-turning to left-turning *Swastikas,* representing accurately the Venusian trajectory of prograde and retrograde switching. This phenomenon in modern day astronomy is called the Venus Pentagram.

Fig. 4

Fig. 5

The European Southern Observatory (ESO 2004) has a beautiful diagram (reproduced as Fig.6 below) showing how Venus traces a pentagram to traverse all the zodiacs. The ESO diagram has chosen the starting point of Venus in Libra, whereas the Harappans chose Leo (Tiger for the Harappans) as we will describe later in this paper.

The diagram also shows the apparent forward (prograde) and apparent backward (retrograde) motion of Venus indicated by the arrow marks in each of the 5 segments. Clearly, the 5 segments (1-2 prograde, 2-3 retrograde, 3-4 prograde, 4-5 retrograde, 5-1 prograde) shown in the diagram below can be directly mapped to the 5 *Swastikas* in the exact same sequence as the Harappan tablet (Fig. 1) - 1-2=right-turning *Swastika*, 2-3=left-turning *Swastika*, 3-4= right-turning *Swastika*, 4-5=left-turning *Swastika*,5-1= right-turning *Swastika*.

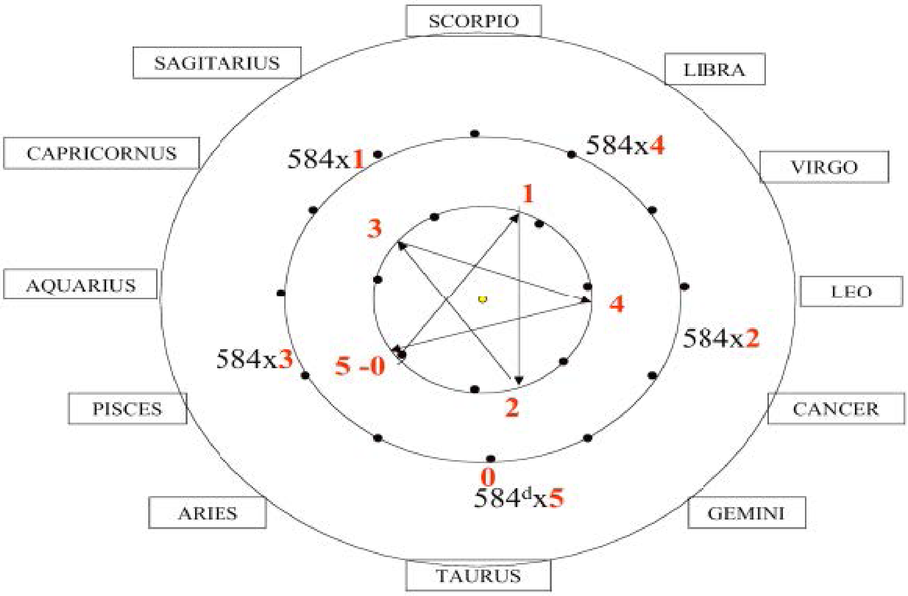


Fig. 6

There is another piece of evidence to show that the Harappans had figured out the complex pattern that Venus weaves in the sky. The image Fig 7 below is reproduced from Vahia & Yadav (2010). The image perhaps shows another type of depiction of the Venus trajectory. The parts that go under the fold could be representing the invisible periods of Venus and the ones above could depict the visible periods of Venus. It is also shown as an endless oran eternal cycle showing that the Venus cycle is endless. We show later through archaeoastronomical analysis that this Venus pattern is endless indeed.

Fig. 7

The Importance of Venus to Bronze Age Astronomy & Venus' Octennial Cycle

Why was it so important to track Venus?
Extract from Frazer 1922, p. 279: *The difficulty of reconciling lunar with solar time is one of the standing puzzles which has taxed the ingenuity of men who are emerging from barbarism. Now an octennial cycle is the shortest period at the end of which sun and moon really mark time together after overlapping, so to say, through- out the whole of the interval. Thus, for example, it is only once in every eight years that the full moon coincides with the longest or shortest day; and as this coincidence can be observed with the aid of a simple dial, the observation is naturally one of the first to furnish a base for a calendar which shall bring lunar and solar times into tolerable, though not exact, harmony.*

The solar and lunar months synchronize every 99 months or approx 8 solar years. The discovery of this coincidence is attributed to Kleostratus of Tenedos (Grote 1846, p. 333). Kleostratus called this eight-year cycle in Greek as *Octoetris.* He preceded Meton of Athens, who is credited with discovering the eponymous 19-year Metonic cycle of the moon in the 5th Century BCE.

The Pythian Festival & Pythian Games at Delphi in Ancient Greece, was an Octennial Festival. It is considered to be the progenitor of the later quadrennial olympic games at Olympia. During the festival a mythical marriage of sun and moon with human actors was enacted (Frazer 1992, Vol. 2, p. 242) clearly showing the astronomical significance. Similar octennial festivals took place in Thebe and in Olympia.

Venus, Snakes & the Meteorological Traditions of Harappa

Besides the need to synchronize the Solar & Lunar cycles as shown above, Venus was also an important predictor of rainfall for the Harappans, which we will show as a continuing tradition in later India [*Pinkala Nigantu* calls Venus *Mazhai Kol,* quite literally Rain Planet]. Through their astute observations, the Harappans also used the behavior of snakes (specifically the King Cobra, *Ophiophagus Hanna*) as an important predictor of rainfall. Snakes are also an important fertility symbol across the Bronze Age civilizations.

The shape shown in Fig.4 can be easily imagined to be a snake and Fig. 5 to be two snakes. This is the other symbolism that the Harappans used to treat the 2 halves of the *Swastika* as 2 snakes.

Typical depiction of snakes is the intertwined copulating snakes, male & female, which is a popular fertility symbol. This symbol be seen in many Hindu temples even today. Whereas in the *Swastika* they are not intertwined and that's where the astute observational powers of the Harappans come to the fore. When snakes copulate, they intertwine themselves fully. However, when 2 male snakes fight for dominance, only their bottom part is intertwined, but the top part is one over the other (India Today 2020). If we extend this metaphor, the *Swastika* represents the fight for dominance between the 2 snakes. Hence, the 2 snakes in the *Swastika* are males, perhaps the 2 sons of Venus (hence brothers). When one of them is winning, the *Swastika* is right turning and when the other one is winning, the *Swastika* is left-turning. And this is an eternal cosmic dance as the cycle keeps repeating every 19 months.

In Dravidian, the 2 snakes are called *Karum-pambu* (black snake - *Rahu*) and *Sem-pambu*(red snake - *Ketu*) [*Pinkala Nigantu*], which are said to swallow the Sun & Moon giving rise to eclipses. This myth also has deeper astronomical significance - during a total lunar eclipse the moon becomes red (red snake) and during solar eclipse the moon becomes black because the solar eclipse can take place only when it is a new moon (black snake).

Swastika is considered to be the world's oldest symbol which has reached far and wide (Wilson 1844) much before the arrival of the Indo-Europeans across the Neolithic world. Possibly transmitted from the IVC through to the rest of the world through the Bronze Age trade network, where IVC was a key participant. The 2 snakes forming the *Swastika* are well-attested in pre-christian Lithuania. A pendant with 2 snakes in *Swastika* form was found in Kernave, a pre-Christian site in Lithuania (YouTube 2011). Goodyear (1891) shows the image of a Boetian (approx 4th Cent. to 6th Cent. BCE) vase having 2 serpents facing each other surrounded by right-turning & left-turning *swastika*s. Important point to note is that Wilson (1844)'s & Goodyear (1891)'s authoritative texts were written before the discovery of the IVC.

There are several references to Venus sightings as a good omen for rains and as a bad omen for failure of rains – *Pattinappalai* verse #1-6, *Purananuru* song 35, *Purananuru* song 117. These verses explicitly state that - when Venus shifts directions and moves south (retrograde), rains fail. This moving South is what is depicted as the left-turning *Swastika*. These references confirm the obsessive tracking of Venus by the Dravidians to foretell the weather conditions, especially the rains. Therefore, Venus tracking was a key part of the ancient meteorological methods devised by the Harappans.

Rangarajan (1987)'s translation of Kautilya's Arthashastra:

> *A good rainy season is one when one-third of the annual rainfall occurs at the beginning (Sravana - July/August) and at the end of the season (Kartika - October/November) and two-thirds in the middle (Praushtapada - August/September and Asvayuja . - September/October)*
>
> *A forecast of the rainfall can be made by observing the position, movement and cloudiness(?) of Jupiter, from the rise, setting and movement of Venus, and from changes in the appearance of the Sun.*
>
> *Inferences can also be made about the [likely] rainfall from Venus, the [successful] sprouting of seeds by observing the Sun and the [healthy] growth of stalks by observations of Jupiter.*

Arthashastra is variously dated from 2nd Cent BCE to 3rd Cent CE and is said to be composed mostly in the northern part of ancient India. We can see that the connection between Venus and rainfall is mentioned. Jupiter has also been mentioned in this context, which might be indicative of an inflection point in the astronomy shifting from the Harappan Venusian to Vedic Jovian.

It gets more interesting. Harappans must have used cues from the behavior of snakes, bird, flowering of the trees as meteorological devices:

1. Amongst the snakes, the female King Cobra (*Ophiophagus Hanna*) is the only one that builds a nest above ground (Hrima et al. 2014) making it easy to observe the female King Cobra's nesting behavior. And the Cobra is the one prominently depicted in Indus iconography and as we have shown above, constitute the 2 snakes that are part of the *Swastika*. Keen observers of Cobra's nest building behavior (choice of site, timing, etc.) can predict the intensity of the monsoonal rainfall. They start building nests in June (Dolia 2019), which precedes the monsoon season by 2 months, which is enough time for meteorological predictions about the coming monsoon season.
2. The snake festival of *Nag Panchami* which occurs in the *Shravana Month* (July-August) at the beginning of the monsoon season. *Panchami* which is the 5th day of the bright half of the moon is symbolically connected to the number 5 (Five Venus Cycles) and *Nag* (Snake usually Cobra) is also connected to Venus as we have shown earlier.
3. That many animals including snakes, adapt their reproductive behaviors to rainfall variations that they perceive on their own is well attested globally (Shine & Brown 2008, Czaja et al 2020).
4. Rautela & Karki (2015) cover the traditional meteorological techniques which includes cues from birds, animals, and reptiles.
5. Dr. A.S. Ramanathan, former Deputy Director General of the India Metereological Department in his book Weather Science in Ancient India (Ramanathan 1993) has covered several techniques extracted from the Sanskrit texts.
6. Tribals using their traditional meteorological techniques are well-attested (Sumi 2018).

7. Newspaper articles covering indigenous tribal wisdom on rainfall prediction (Al Jazeera 2013, Times of India 2019 and The Hindu Businessline 2015).
8. Sivaprakasam & Kanakasabai (2009) correlated the rainfall predictions using the traditional almanac vs actuals over a 60-year period and show that the almanac method is reasonably accurate.

The above firmly establishes the meteorological importance of snakes (especially Cobras), which enhances the already established connection between Venus, meteorology, and snakes (Cobras). These evidences are sufficient to establish the origins of India's meteorological traditions in Harappa.

Two Intersecting Circles [IM77 Sign #403]

It is a conjunction. Parpola (1994 p 206) connects the frequently occurring intersecting circles motif to the *Katyayana Sulba Sutras*, and the rope circles used in Astronomy for orientation. Parpola (1994) has also connected the intersecting circles to the *God Muruka*. Given the clear astronomical context established by the *Swastikas* for H-182, conjunction as the meaning for this sign fits better. Given the deep astronomy behind the *Swastika* symbol, it is likely that the Harappans plotted the rising of Venus using pegs marked in a circle similar to what is described in the *Katyayana Sulba Sutras*. Without such elaborate records, Harappans couldn't have tracked the Venusian 8-year cycle or the 19-year Grand Cycle of Venus or the 30-year cycle of Saturn.

Parpola (2013) shows many examples of concentric circles as a motif in the Harappan iconography. In most of those examples, multiple sets of concentric circles (upto 4) appear in the same inscription. It is possible that they had a epicycle model of all the planets they were tracking. Since they seem to have tracked Venus which has a peculiar orbit, it is possible that they had developed the epicycle model also. Neugebauer (1975) has a detailed explanation of the epicycle model of the ancients.

Therefore, a pair of intersecting circles denoting a conjunction of heavenly objects is quite probable.

Jar Sign [IM77 Sign #342]

Mahadevan (1972) has already argued that the jar sign is the sacrificial jar. In this context, it could signify a ritual with offerings or a festival to propitiate the Goddess, Venus.

Tiger Constellation Is the Later Day Leo Constellation

There has been a substantial amount of discussion around the total absence of horses in the IVC Corpus. However, the total absence of lions in the IVC corpus has not attracted any discussion so far. The absence of lions is an anomaly because lions were most likely present in the IVC region.

Barnett et al. (2014) have shown the spread of Lions from their homeland in Africa. Their data shows that there should have been plenty of Lions in the IVC region. To make matters

curiouser, Sumer, the key IVC trading partner, had lions in their iconography quite prominently, especially in connection with *Inanna Ishtar*, the goddess Venus. What explains this anomaly?

The tiger's prominence, especially in seemingly religious contexts like K-52, when combined with this anomalous absence of lions, makes it likely that the IVC considered themselves as Tiger people in symbolic contrast to the Lion people that were dominant in the Bronze Age.

Venus' near perfect 8-year cycle, where it returns to the same point in the sky, means that the Harappan astronomers could have chosen any point in the sky. The fact that they chose the rising of Venus in Leo (Tiger in Harappan astronomy) strengthens the importance of Tigers and the notion of IVC being Tiger people as opposed to the then prevalent Lion people.

And this is one very important piece of evidence for the Harappan origin of the star charts. The Tiger constellation got renamed to Leo through the fascinating round trip journey the star charts of Harappa have taken across the world to Europe and back to India as elaborated in a later section.

Dhanishta, the 24th Nakshatra, Drum, Full Moon

When the Sun is in Leo (Tiger), full moon can occur only in Aquarius (the Sun & Moon need to be in 180-degree opposition for a full moon).

Dhanishta, is in alignment with the Aquarius constellation (of the 4 padhas of *Dhanishta*, two are in Aquarius and the other two are in Capricorn) and hence a full moon is possible.

Table 2 below is a compilation of the symbols of the 27 Nakshatras from Burgess (1935) with an additional column to connect them to the IM77 signlist (Tentative) as explained later. Table 1 shows that *Dhanishta* is assigned Drum or Tabor symbol.

Why did the Harappans depict a drummer instead of a drum? A drum depicted as such may be hard to interpret accurately. Also, during special occasions, especially weddings, the beating of the traditional drum is still practiced. Therefore, the Harappans may have chosen to depict the drummer also to mark the extra special occasion.

Till date, in Hindu astrological tradition, the Moon's position in a particular Nakshatra (and not the phase of the moon) is used to mark the day of the month for birthdays and other auspicious occasions because that is more repeatable every year. This is because the actual phase of the moon repeats only every 19 years per the Metonic cycle and hence the moon phase can't be used as a reliable marker. Therefore, in this tablet, the drummer denotes that the Moon is in *Dhanishta* when this festival occurs. It may or may not be the full moon, though the first time the Harappans observed the phenomenon, it most likely was a full moon. A full moon in *Dhanishta* when Sun is in Leo would occur only every 19 years per the Metonic Cycle.

We were able to map the symbols of the Asterisms in Table 2 to the IM77 sign list for 21 of the 27 Nakshatras. Therefore, it is reasonable to conclude that the entire Nakshatra system is represented in the Indus corpus. The Nakshatras that have an underline are the 12 special ones whose names were given to the months when the Luni-solar calendar was created. According

to astrological folklore, a full moon occurred in those asterisms when the Luni-solar calendar was created further giving credence to the importance of full moon days.

The mapping of the 27 Nakshatras to the 12 Zodiacs is given in Table 3 below. The moon's 27 stations are covered by 24 constellations as 3 of them are split into 2 halves to get the 27. Combined with the 12 Zodiacs, there are 36 important constellations that were tracked. This table shows the alignment of *Dhanishta* to one half of Aquarius, the other being Shatabhisha.

Ancient astronomical treatise *Surya Siddhanta* (Burgess 1935) mentions in its opening statements that the *Surya Siddhanta* was first obtained directly from the Sun God (*Surya*) by Maya, an Asura [Asura is the Vedic term for demons and may have denoted the local people prior to the amalgamation with the Vedic people]. This could mean that the *Surya Siddhanta* is based on an older Dravidian text which was probably lost due to the ravages of time.

#	Star	Burgess (Surya Siddhanta)	Tentative IM77 Sign #
1	Ashwini	horse head	
2	Bharani	yoni; pudendum muliebre	[#194, #195, #196] - stove #365 #323 (yoni)
3	Krittika	broad bladed knife with a short handle	[#194, #195, #196] - stove #365 #323 (yoni)
4	*Rohini*	Wagon	
5	Mrigashirisha	Deer Head [*Ezhu Meen*]	[#194, #195, #196] - stove #365 #323(yoni)
6	Adhira or Arudra	gem	
7	Punarvasu	House	#134
8	Pusam/Pushya	Crescent or barbed head of an arrow	#212
9	Ashlesha	Wheel	#391
10	Magha	house or Sickle (if the 6th star in included)	#391
11	Purva Phalguni	Front legs of bed (bed stead)	#182
12	Uttara Phalguni	back legs of bed	#182
13	Hasta	hand or five fingers	#338, #399
14	Chitra	pearl or lamp	

15	Swati	Coral bead or gem or pearl	#396, #397
16	Vishakha	Festoon (*torana*) or outer door or gate, a decorated gateway	#180, #181
17	Anuradha (Anusha)	row of oblations or row of offerings or simply row	
18	Jyeshtha (Kettai)	ear ring, pendant ear jewel	
19	Mula	scorpion's tail or sting,	
20	Purva Ashadha (Pooradam)	bed or elephant tusk	#205 #182 #183
21	Uttara Ashadha (Uttaradam)	bed or elephant tusk	#205 #182 #183
22	Abhijit	triangle or triangular nut of srngata	not included in the 27 star list
23	Shravana (Thiruvonam)	3 footsteps or trident	#339 #162 #163 #164
24	*Dhanishta* (Avittam)	drum or tabor	Drummer in H-182
25	Shatabhisha (Sathayam)	circle	#373 #374
26	Purva Bhadrapada (Poorattadhi)	Front legs of funeral cot	#185
27	Uttara Bhadrapada (Uthirattadhi)	back legs of funeral cot	#186
28	Revathi	drum or tabor	Drummer in H-182

Table 2

#	Nakshatra	Mapping to Zodiac Sign
1	Ashwini	Aries
2	Bharani	Aries
3	Krittika	Taurus
4	Rohini	Taurus
5	Mrigashirisha	Gemini
6	Adhira or Arudra	Gemini
7	Punarvasu	Cancer
8	Pusam/Pushya	Cancer
9	Ashlesha	Leo
10	Magha	Leo
11	Purva Phalguni	Leo
12	Uttara Phalguni	Virgo
13	Hasta	Virgo
14	Chitra	Libra
15	Swati	Libra
16	Vishakha	Scorpio
17	Anuradha (Anusha)	Scorpio

#	Nakshatra	Mapping to Zodiac Sign
18	Jyeshtha (Kettai)	Sagittarius
19	Mula	Sagittarius
20	Purva Ashadha (Pooradam)	Sagittarius
21	Uttara Ashadha (Uttaradam)	Capricorn
22	Abhijit	Not Included in the 27 Nakshatra system
23	Shravana (Thiruvonam)	Capricorn
24	*Dhanishta* (Avittam)	Aquarius
25	Shatabhisha (Sathayam)	Aquarius
26	Purva Bhadrapada (Poorattadhi)	Pisces
27	Uttara Bhadrapada (Uthirattadhi)	Pisces
28	Revathi	Pisces

Table 3

Why were the 3 signs repeated on H-182 sides A&B?

Harappans have been extremely succinct in their inscriptions which is a key blocker for decipherment as discussed in the earlier sections of the paper. In this context, why did the Harppans chose to repeat the 3 symbols—2 Vertical Lines (Venus), 2 Intersecting Circles (Conjunction) and the Jar (Offering)?

Harappans have repeated the 3 symbols on both sides to show that this Octennial conjunction is a very important festival by applying the Two is Great symbology (Sukumar 2020). In Dravidian there is the notion of a festival (*ViLa*) and that of a great festival (Peru*ViLa*). It is not hard to imagine that this important festival would be a Peru*ViLa*. Today the festivals *Maha Kumbh Mela* (North India) and *Maha Maham* (South India) take place once in 12 years (Duodecennial). The Sanskrit prefix *Maha* means great or grand and it is used in the names of both these duodecennial festivals which are celebrated on a massive scale. The Venus Octennial festival would have been a similar great or grand occasion. The repetition of the 3 symbols conveys that greatness or grandeur of the occasion.

E. Harappan astronomy and its seminal role

Comparison to the Venus sightings in Babylon

The Venus Tablet of *Ammisaduqa*, Babylonian Celestial Omens List—*Enuma Anu Elil, Babylonian* Astronomical Compendium Mul APin the Babylonian Nam Bur Bi rituals are some of the earliest known records of astronomical observations known to humankind as on date. Neugebauer in his landmark book (1975) says that the earliest these can be dated is 1000 BCE. He also says these are based undoubtedly on older materials.

Pingree (1997) dates the Venus Tablet of *Ammisaduqa* to King *Ammisaduqa*'s reign from 1702 BCE to 1681 BCE. Pingree (1997) also dates the lunar eclipse omens from the Ur III dynasty tentatively between 2300 BCE and 2050 BCE. This tentative date 2300 BCE from Pingree is the earliest date ascribed to any part of the Sumerian/Akkadian/Babylonian astronomical corpus by any scholar.

Neugebauer (1975), Pingree (1989) and many other scholars have concluded that most of this type of deep astronomy originated in Babylon. For example, Pingree (1997) :

> *Thus, the Babylonian astral sciences in a form that they had reached in the Achaemenid period, before the remarkable development in astronomy, or the less remarkable one in omens of the Seleucid period became the foundation of Indian Jyotihsastra.*

Parpola (2013) has done a detailed refutation of Pingree's position that the Indian system is derived from Mesopotamia. Parpola (2013) goes on to show that the Harappans devised the Nakshatra system in the Early Harappan period (3300-2600 BCE). Burgess (1866) gave a detailed explanation of why the Nakshatra system is indigenous to India and he dates it to 1500 BCE.

The tablet H-182 is from the Mature Harappan Period (2600-1900 BCE), which makes it atleast 300+ years older than the earliest astronomical records in Babylon which is 2300 BCE (Pingree

1997). Another point to note is that the records from 2300 BCE that Pingree (1997) refers to are for lunar eclipses which are not that difficult to track compared to tracking the Venus cycle.

Therefore, the currently accepted theory, that deep astronomy of this kind spread from Babylon to Greece and from there to India and other countries, could be incorrect. One of the principal reasons for this error is the fact that the IVC script has not been deciphered and hence, the deep astronomy of the IVC was not known earlier. The modern zodiac sign system is attributed to scholars in Spain. They had translated into Latin, a text called the Book of Fixed Stars written in Arabic by Al Sufi in the 9th Century CE. Al Sufi had in turn compiled his book by translating Ptolemy's Star Chart called the Almagest (Toomer 1984) written in Greek in the 2nd Century CE.

The Almagest is the earliest comprehensive star chart that is known to humanity. Based on the positions of the stars in the star chart of Ptolemy, British astronomer Walter Maunder calculated the approximate place and time period of the original star chart. Relevant passage from Maunder (1912):

> *The stars were therefore grouped together into constellations and associated with certain fancied designs, and twelve of these designs were arranged in a belt round the sky to mark the apparent path of the Sun in the course of the year, these twelve being known as the "Signs of the Zodiac". The Ram, Bull, Twins, Crab, Lion, Virgin, Balance, Scorpion, Archer, Goat, Water-pourer, and Fishes.*
>
> *In the rest of the sky, some thirty to thirty-six other groups, or constellations, were formed, the Bear being the largest and brightest of the constellations of the northern heavens.*
>
> *But these ancient constellations do not cover the entire heavens ; a large area in the south is untouched by them. And this fact affords an indication both of the time when and the place where the old stellar groups were designed, for the region left untouched was the region below the horizon of 40 North latitude, about 4600 years ago. It is probable, therefore, that the ancient astronomers who carried out this great work lived about 2700 BCE., and in North latitude 37 or 38. The indication is only rough, but the amount of uncertainty is not very large ; the constellations must be at least 4000 years old, they cannot be more than 5000.*

Ptolemy lived in Alexandria which is at 31°12′N 29°55′E, which is approximately 1000KM away from the latitude of 40° N that Maunder has identified. In that case, where did Ptolemy get his knowledge from? Rogers (1998) has given a timeline of the evolution of the Mesopotamian star charts:

1. *The early pictographic phase ~ 3,200 - 2,100 BCE.*
2. *The boundary stone pictograph phase ~ 1,350-1,000 BCE.*
3. *The Three Stars Each Phase greater than or equal to 1,100 BCE.*
4. *The MUL A PIN phase 1,100-700 BCE.*
5. *The astronomical diaries phase ~ 750-60 BCE*
6. *Transmission of the star charts to the Greeks & Arabs.*

Rogers (1998) mentions:

> *"The Sumerian deities were mostly associated with fertility and animal husbandry, but the Akkadian deities were predominantly astral, representing, sun, moon and stars. In order to unite the country ... [these] deities were combined and a standard iconography devised so that they could easily be identified visually. The fine seal of Adda illustrates the process. - D. Collon[Ref.17]. See our figure 2.*
>
> *Thus, from 2,300 BCE [starting from Sargon of Akkad's reign] many seals showed divine figures including those which became the zodiac, as well as bulls, lions, and other animals. The 'zodiacal' figures do not tend to be grouped together and there may be no astronomical intent;rather, in all the pictograph tradition, we see symbols of gods which were also displayed in the stars.*

It is clear from the above and from the entire Rogers (1998) paper, the zodiacal tradition currently assumed to be from Sumer/Babylon can be dated to no earlier than 1,350 BCE. Pingree (1997) has proposed the earliest date of 2300 BCE for the Sumerian/Babylonian tradition and that early date is for the Lunar eclipses data and not necessarily the entire star chart astronomy. Tracking Lunar eclipses is not that hard relative to tracking the trajectory of Venus.

From a latitude perspective, 37 deg N to 38 deg N, as calculated by Maunder (1912) is probably within the Mesopotamian/Babylonian geographic boundary (1 degree of latitude is 111KM). Rogers (1998) depicts a star chart of the Babylonian sky from 2,800 BCE at 36 deg N which doesn't have all the zodiacal constellations, showing that their astronomical knowledge had not reached an advanced stage at that point in time.

Therefore, the Mesopotamians couldn't have been the original star chart makers which Maunder (1912) has dated to 2700 BCE. Trade between Sumer & IVC is well-attested from at least around 2,800 BCE (Bernstein 2008) which coincides quite well with the Mature Harappan period (2,600 BCE- 1,900 BCE). Sargon's Akkad has referred to the IVC as *Meluhha* in Akkadian texts. Vermaak (2008) has shown that there was a big colony of *Meluhhans* in the city of Guabba, in Southern Mesopotamia with their own temple, delivering barley to the royals, weaving clothes for the locals etc. Through this *Meluhhan* colony, the astronomical knowledge might have passed through first to the Akkadians and later to the Babylonians. This makes IVC a better candidate for Maunder's (1912) original star chart makers.

Additionally, the northernmost city of the IVC is Shortugai which is at 37°19′30″N 69°31′30″E. That puts Shortugai exactly in the 37 or 38-degree North latitude Maunder (1912) has calculated. And the period of 2700 BCE calculated by Maunder (1912) puts it squarely in the Mature Harappan Period. This also tallies with Parpola (1994, p. 201)'s inference that the Harappan nakshatra calendar originated in the Early Harappan period (3300-2800 BCE). Shortugai is a trading outpost of IVC approximately dated to 2000 BCE. It is quite possible that Harappan astronomers had an outpost in Shortugai. In short, Harappan astronomers are the likely creators of the ancient star charts which form the basis of the modern zodiac system.

We show next that the constellation that we now know as Leo was Tiger. We have already established that the modern-day Zodiac is derived from Al Sufi's works. In fact, many of the stars still bear the Arabic names given by Al Sufi (for example, Aldebaran).

Carboni (1997) has depicted the images of the Zodiac signs from across the medieval Islamic world. In page 32, there is a bowl with an image of what is clearly a Tiger but identified as the Leo constellation. Another interesting object in the same book (Carboni 1997, p. 37), a pilgrim flask, perhaps offers more conclusive evidence of the Harappan origins of the star charts. The flask has 12 medallions, each representing a zodiac sign. The one showing Libra is an interesting one. Closer scrutiny of the image representing Libra, shows a human being holding the scale over the shoulders behind the back and the scales are hanging off a rod which looks like a yoke. Libra in modern times is thought to present a scale (or balance), which is a weighing instrument, which is never held behind the back. This imagery suggests that the makers of the pilgrim flask depicted a *Kavati* Carrier. *Kavati* carrier, the yoke carrier, is a frequent occurrence in the IVC Corpus (Parpola 1994). Parpola (1994 p110) has analyzed this religious ritual which is done even today by the Dravidian people and connected it to the Indus signs (IM77 signs #11, #12, #13, #14, #15). Given that the Arab artists have clearly depicted the yoke, and the fact these yoke carrier signs occur in the astronomical & religious contexts like H-177, could this be the original symbol for Libra? And that it got mis-calqued to a Scale?

As we have shown in the earlier part of this section, the Arabic works were translated into Latin by scholars in Spain. Interestingly, Olcott (1911, p. 252) has documented that Libra also had the Latin name "*Jugum*" which means yoke. The actual Latin words for balance/scale are *Libra, Statera,Trutina*. Since the translators didn't use these but used *Jugum* confirms that Libra was originally the yoke carrier from Harappan astronomy which later became a balance or a scale. The modern name for Libra in Indian astrology is *Thula* (meaning balance). This is another example of round trip calquing from Harappa to Europe and back to India with a new name which is not easily connected to the original name. Given how unique the *Kavati* (yoke carrier) ritual is, we can with greater certainty establish the original creators of the star charts as the Harappans.

Deep Astronomy of H-182 tablet

The astronomy gets more interesting. To predict the moon's phases, astronomers need to know that moon's phases repeat themselves every 19 years, in what is called the Metonic cycle in modern astronomy. Metonic Cycle is attributed to Meton of Athens in the 5th Cent. BCE. Harappans may have spotted the Metonic Cycle through 2 methods:

a. The time period of 12 synodic periods of Venus, comes to 19 years, which we could call the Grand Cycle of Venus. Therefore, by tracking Venus, the Harappans could predict the phases of the Moon.
b. As shown already, the Octennial festival might have started originally when the Sun & Venus were in Leo and the Moon was in *Dhanishta* and it was a full moon. This same configuration repeats itself every 19 years.

To predict eclipses, astronomers need to know that the eclipses always occur at either the ascending or the descending lunar node and that the eclipses repeat themselves every 18 years. Modern astronomy calls this the Saros Cycle. Babylonian astronomers discovered this cycle which is 18 years & 10-12 days (= 223 months = 6585 days) in the 5th Cent BCE.

The Saros texts of Babylon (Aaboe et al. 1991) are the earliest known records of the Saros cycle. The exact provenance of these texts is not conclusively known. The Saros period of 223 months (6585 days) was fully developed by the middle of the 5th Century BCE and around the same time the Babylonians shifted their calendar to a 19-year cycle (de Jong 2017). He, de Jong (2017), quotes Britton, who studied the Saros texts extensively:

> *In his study, Britton emphasizes that the invention of the Babylonian zodiac of 360° must predate – or have been invented simultaneously with – the construction of system A lunar theory. He suggests that the invention of the Babylonian zodiac must have taken place between 409 and 398 BCE, consistent with his dating of system A lunar theory. His dating is somewhat late compared to the more generally accepted view that the Babylonian zodiac was introduced into Babylonian astronomy sometime during the second half of the fifth century BCE.*

Harappans knew the Saros cycle because as we have shown elsewhere in this paper, they started tracking the Lunar Nodes and knew the 18-month period of the Lunar Nodes to move from one zodiac to another. They also went further tracked the conjunction of the Lunar node with the other visible planets.

It is clear from the above that the Harappan astronomers had figured out that the moon, the lunar nodes (eclipses) and Venus are all operating in a 18 to 19-year cycle together and that by tracking Venus closely and it's 19-year Grand Cycle, they could predict eclipses and moon's phases, and synchronize the solar and lunar calendars. They have done that a millennia before any other culture in the ancient world. We have also shown in earlier sections of this paper that they also used the Venus sightings to predict rainfall and more generally, the seasonal weather conditions.

Unification of The Rig Vedic & Harappan Eclipse Myths

We have already established that the tablet can be deciphered only using Dravidian and not Sanskrit or Munda, the other 2 candidate languages for the IVC. However, the names of the 27 Nakshatras, the 2 lunar nodes (*Rahu* & *Ketu*) where eclipses occur are Sanskrit words and are still a part of the Hindu astrological practices till date, at least from 1500 BCE (Burgess 1866). How might the astronomy/astrology have shifted to Vedic from Dravidian?

Rig Veda (RV) is the oldest known document from the Vedic corpus and is dated variously between 1,700 BCE to 1,000 BCE. V.040 is the only hymn in the entire RV that mentions eclipses and in that context refers to an eclipse demon called *Svarbhanu*. In the same hymn, RV mentions that the Sage *Atri* sings some holy songs, and the eclipse demon *Svarbhanu* releases the Sun. This eclipse myth in the RV is in sharp contrast to the deep astronomical basis of the Harappan eclipse myth as described in the prior sections of this paper. There must have been a point at which the Dravidian astronomy-based mythology got unified with the Vedic religion-based mythology.

That unification was achieved through the famous episode of *Samudra Manthan (Vishnu Purana)* – *Svarbhanu* is shown to be a snake by that point [Another point to note - RV (V.040) shows *Svarbhanu* as a demon and not as a snake] - Through deception *Svarbhanu* swallows the divine nectar of immortality. *Vishnu* spots this and cuts *Svarbhanu* into two, separating the head and the tail of the snake – *Rahu* and *Ketu*, who represent the 2 lunar nodes. That means after the amalgamation with Vedic, we have only one snake instead of two. Over millennia, *Rahu* & *Ketu* became firmly entrenched in the later Indian Hindu astrological tradition which continues to this day. The connection to Venus and her 2 snake sons is lost.

F. The Harappan Astronomical Model for Celestial Omens

Per the modern day heliocentric viewpoint we follow today, the order of the planets orbiting the Sun that we can observe with the naked eye is 1.Mercury, 2.Venus, 3.Mars, 4.Jupiter & 5. Saturn. Interestingly, in the geocentric viewpoint which would have been used by the ancients including the Harappans, the order of the naked eye planets is the same. This is because for an observer on earth, Mercury will return to its position in the sky relative to the Sun, the fastest and Saturn the slowest in the same order as in the heliocentric viewpoint. Harappans, being astute observers noticed the crooked orbits with prograde and retrograde motions and hence the planets were known in Old Tamil as *Kōn Min* – the crooked fish. Again, through their advanced astronomy skills were also able to create an epicyclic model to account for the prograde and retrograde motions of the naked eye planets. That they also knew about the Lunar nodes and were tracking that is truly a testament to their advanced astronomy knowledge.

Mercury

Parpola (1994) has identified IM77 Sign #72, the fish with a slash over it as Mercury. Parpola reasons that the slash mark represents division and connects it to Old Tamil *pagu-min* (dividing fish)/ *pasu-min* (green fish). Parpola goes further to connect the green color to emerald color of Mercury used in the later *nava-graha* tradition.

Parpola's derivation misses a key aspect of Mercury which could provide another important evidence of the advanced astronomical skills of the Harappans. Since Mercury is the first planet, it also got assigned One (Sign #86). Sign #86 which is 1 is an allograph of Sign #72 because it occurs Solus in many inscriptions, signifying a Mercury transit. As we show in later sections of the paper, Harappans had calculated the epicyclic period of Venus as 228 and Mercury epicyclic period is 116 which is approximately half of Venus, thereby the fish cut in half with a slash mark.

There is another indicator for the Mercury = Half Venus depiction. Sign #93 which uses a Slash with the Sign #87 (#87 is an allograph for Venus). Also, Sign #93 occurs as Solus in many inscriptions depicting a Mercury transit. Mercury is *Budhan* in Sanskrit and borrowed as it is into Tamil. Sign #93 which can be translated to *arai-Velli* [Half Venus] which may have been the Old Tamil name which has been lost. Applying bilingual parallels, *arai-Velli* sounds like *aRivALi* (means knowledgeable) and that got translated to *Budhan* the Sanskrit word for Mercury. Though the R in *aRivALi* is the aspirated R it is hard to distinguish the *r & R* when they are spoken.

Mars

Mars is the third planet and hence the Three (Sign #89 or Sign #103). In Sanskrit, Mars is *Mangal* which means auspicious. Interestingly, having Mars in the birth chart is inauspicious. The reason for this dissonance is that the Old Tamil word for Mars is *Sevvai* (Red Mouth). Red Mouth denotes Auspicious in Old Tamil tradition which got translated to *Mangal*. Tamil retained the name *Sevvai,* thereby giving us the key evidence of the bilingual parallels method based on how the name got mis-translated.

Jupiter

Jupiter is the fourth planet and hence the Four [Sign #95 or #105]. In another important indicator of the Harappan astronomical prowess, they figured out that Jupiter is the biggest & assigned Sign #67 which is a horned fish. Even today in Malayalam (Dravidian language), *Komban* the "horned one" means elephant. In Tamil, Jupiter is *Vyazhan* which is etymologically connected to the Old Tamil word for elephants, *Vezham [Akananuru* 309]. In Sanskrit, Jupiter is *Brihaspati*, the "Big one" whose mount is an elephant or *Guru,* meaning teacher and the designated teacher of the *Devas* in contrast to *Shukra,* the teacher of the *Asuras*. The teacher designation was used to switch the Venusian Astronomy to Jovian Astronomy.

Saturn

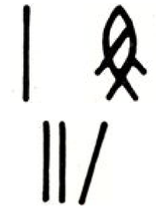
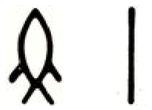
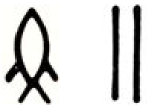
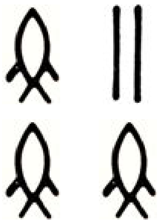
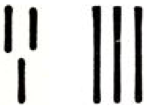
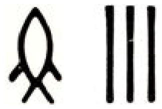
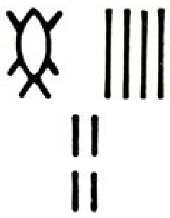
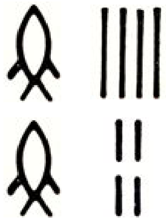
Parpola's (1994) derivation misses a key aspect of Saturn which could provide another important evidence of the advanced astronomical skills of the Harappans. Since Saturn's trajectory takes approximately 30 years to cover all the zodiac signs, it can be seen as the one with the outermost orbit amongst all the 5 planets that can be seen with the naked eye. Outermost orbit can be thought of as the highest which can be interpreted as the roof of the planetary system, and hence the roof fish. To track a heavenly object over a 30-year period is evidence of advanced astronomical skills. Sign #96 which is 5, is an allograph of Sign #65 because it occurs Solus in many inscriptions, signifying a Saturn transit. Sign #96 also occurs with Sign #59 (basic fish sign), which is also an allograph for Saturn.

Ascending Lunar Node *(Rahu)*

Parpola (1994) says that Sign #70 is *Rohini*. We disagree. The dot in the fish can be thought of as Karu which can mean foetus or black in Tamil. In an obvious connection, fish seemingly carry their eggs in the stomach. [Technically, it is stored near the stomach, but ancients may not have known the fish anatomy that well]. Also, Eclipses bring darkness which is a bad omen and the eclipse release symbolizes birth (foetus). This also ties with the symbolism of *Rahu* & *Ketu* being the 2 snake sons of Venus that we cover later. By tracking the transits of the Lunar Nodes, they were able to observe the Saros Cycle and were able to predict eclipses accurately in another indication of their advanced astronomical prowess.

We have summarized the above findings in the table Table 4 below.

Through detailed observations of Venus and later the other 4 planets visible to the naked eye – Mercury, Mars, Jupiter & Saturn, quite obviously, using the geocentric viewpoint and with

Planet	**Singe Sign Allographs**	**Twin Sign Allographs**	**Comments**
Mercury	 Sign 86, 72, 93	 Sign 59, 86	Budhan in Sanskrit and borrowed as is into Tamil. Sign #93 which can be translated to Arai-Velli [Half Venus] may have been the Old Tamil name which has been lost. Applying bilingual parallels, Arai-Velli sounds like ArivALi (means knowledgeable) and that got translated to Budhan the Sanskrit word for Mercury. Since Mercury is the first planet, it also got assigned One (Sign #86).
Venus	 Sign 59, 87	 Sign 59, 87, 59, 59	Parpola (1994) has identified the fish plus two vertical strokes as Venus . He uses the rebus principle to show the Old Tamil name for Venus white star/ silver star ven-min/vel-min. That Sign #87 is an allograph of Sign#59 + Sign #87 is Parpola's finding. Doubling of Sign #59 is another allograph found by this paper's author. Venus is the second planet, hence the Two (Sign #87).
Mars	 Sign 103, 89	 Sign 59, 89	Mars is the third planet and hence the Three. (Sign #89 or Sign #103). In Sanskrit, Mars is Mangal which means auspicious. Interestingly having Mars in the birth chart is inauspicious. The reason for this issue is that the Old Tamil word for Mars is Sevvai (Red Mouth). Red Mouth denotes Auspicious in Old Tamil tradition which got translated to Mangal [Bilingual Parallels].
Jupiter	 Sign 67, 95, 105	 Sign 59, 95, 59, 105	Jupiter is the fourth planet and hence the Four [Sign #95 or #105]. In another important indicator of the Harappan astronomical prowess, they figured out that Jupiter is the biggest & assigned Sign #67 which is a horned fish. Even today in Malayalam (Dravidian language), Komban the "horned one" means elephant. In Sanskrit, Jupiter is Brihaspati the "Big one" whose mount is an elephant Airavata [Bilingual Parallels]

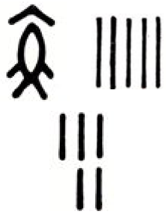
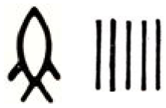
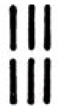
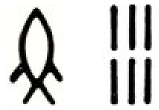
Saturn	 Sign 65, 96, 107	 Sign 59, 96	Saturn as roof fish Sign #65 is Parpola's finding. It is the 5th planet and hence the Five [Sign #96 or #107]. Parpola (1994) shows that it is mai meen (black one) or vai-meen (roofed one) and the connection to tortoise which is slow moving. In Sanskrit, Saturn is Shani the slow one. Old Tamil also uses Sani the old moniker has been lost [Bilingual parallels]
Asc Lunar Node (Rahu)	Sign 70		Parpola (1994) says that Sign #70 is Rohini. We disagree. Parpola has covered a lot of material to show it is a black dot inside the fish sign. The dot in the fish can be thought of as Karu which can mean foetus or black in Tamil eclipses bring darkness and the eclipse release symbolizes birth (foetus). This also ties with the symbolism of Rahu & Ketu being 2 snake sons of Venus that we cover later.
Pleaides/ Krittika	 Sign 109	 Sign 59, 109	Parpola (1994 p 194) has shown this frequent sign sequence of fish and six as Krittika (Pleiades) which is called āru meen in Old Tamil, literally six fishes. We agree with this identification, though Parpola has not given the meaning. As explained above this sign sequence represents the Karthigai Festival.

Table 4

their original creation of the Star maps, they mapped out the sky. They also tracked the Lunar Nodes, which later became known as *Rahu-Ketu* – the name currently in vogue and they had assigned the status of a planet to the Lunar Nodes as part of their Omen system.

Because of the geocentric viewpoint, they were forced to account for the apparent prograde and retrograde motions of the planets.

For example, Mercury has approx. half the epicyclical period of Venus and the Harappans knew that through observation and hence they had named Mercury as Half-Venus. They couldn't have made this determination if they had not figured out the epicyclic periods of the 5 planets and the Lunar Nodes. This means that they had figured out the epicyclical model 100s of years or even a 1000 years before Ptolemy did in the 5th Century BCE.

1. Using the star maps, they created the following simple omens:
2. A direct transit where the planet enters a Zodiac in prograde. This is represented in the seals with the planetary sign appearing as Solus or with the planetary sign followed by the jar sign #342. Jar sign as we later explain, standing for a good omen or a festival. If a planetary sign appears, Solus it indicates a direct transit. Using this model, we were able to easily find the allographs for each of the planetary signs mentioned in Table 1. In Tamil direct/prograde transit is called *Peyarcci*.

3. A retrograde transit where the planet enters a Zodiac in retrograde motion. This is represented in the seals with the planetary sign followed by the spear sign #211. Using this model we were able to identify a number of bad planetary omens. A number of theories of have been proposed by scholars for the spear sign. In this celestial omen context, the spear could be interpreted as *Kuttu Eeti* [DEDR 1719 Ta. Kuttu] meaning spear. *Kuttu* means bad omen in astrology. In Tamil, the Retrograde Transit is called *Vakra Peyarcci,* whose original name would have been *Kona Peyarcci* as explained in an earlier section.
4. Conjunctions of 2 planets or 3 planets including conjunctions with the Lunar Nodes. [No 4 planet or 5 planet conjunctions have been identified in the corpus so far]. There are simple conjunctions where the planetary signs are followed by the jar sign #342 or the lance sign #211. Sometimes the conjunction sign #403 also appears in the inscription, as in the Cunningham seal which represents a Mercury Venus, conjunction on the Vernal equinox day.
5. Solstices. Solstices split the year neatly into 2 halves of 6 months. Sign #391, the six-scoped wheel indicates this because #391 is followed only by Sign #99 (numeral two) or Sign #97 (numeral one) or by itself. Since the new year would have been during the Vernal equinox, the Winter Solstice will be the second solstice and hence the #391 followed by #99. *Uttarayana* (the Sanskrit term for Winter Solstice), the northward movement of the Sun, winter solstice is still considered the more important of the 2 solstice which explains the relative preponderance of the #391 #99 sign sequence. The #391 by itself may represent the Summer Solstice.
6. Equinoxes. Equinoxes split the year neatly into 4 quarters. Sign #267, a square with one quarter marked with a miniature square, likely indicates the Equinoxes. #267 is most often followed by #99 (two) or #267 appears by itself. The relative preponderance of the #267 #99 sign sequence suggests that it represents the Vernal equinox, because the Vernal equinox which usually marked the start of the new year was very important for the Neolithic cultures as the start of spring and the agricultural season. Maybe they used the Two is Great symbology (Sukumar 2020) to add a two to the equinox symbol to signify its importance. The less likely possibility is that for the Harappans, the Autumnal equinox was more important and the sequence #267 #99 represents the Autumnal equinox.

We have been applying this model iteratively to discover the symbols for Solstices and Equinoxes mentioned above. Let us take another example of how the model above could be used. Per the model, there must be a seal having the spear sign #211 solus meaning bad day & the jar sign present #342 appearing solus meaning good day. Sure enough, the concordance shows that there are such seals. For example, #2516 inscription has only one sign #211. Similarly, seal numbers #1052 and #2827 have only the jar sign #342 solus. The almanac also has entries for bad days (*Kari Naal*) and good days (*Nalla Naal*).

For the simple omens with very few signs, we show the decipherment in this paper. Based on the above, they have also created several complex omens involving the planets and the 27 Nakshatras, which are not decipherable as of now.

Interpreting the Celestial Omens List in the Indus corpus

We extracted the concordances for each of the 6 planets [Mercury, Venus, Mars, Jupiter, Saturn and *Rahu* (Lunar Asc Node)] into 6 files.

Based on the planetary signs described above and the pattern of good omens and bad omens decribed above, we annotated each of the inscriptions with the deciphered meaning & partially deciphered meaning.

This exercise is summarized below:

**Due to the presence of conjunctions the totals will have duplicates

It is clear from the above table that Venus omens form 30%+ of the total number of omens showing the Venusian nature of Harappan astronomy. The entire list of 132 fully deciphered

Planet	# deciphered	# partially deciphered	# undeciphered
Mercury	9	18	293
Venus	32	20	536
Mars	10	2	310
Jupiter	8	10	321
Saturn	5	6	220
Rahu (Asc Lunar Node)	5	7	60
Grand Total**	69	63	1740

Table 5

& partially deciphered seals are in Annexure A at the end of this paper.

There is another evidence to show that the Harappans thought of these omens as a Mercury Series, Venus Series, Mars series and so on. In the full concordance of the 6 planets referenced in Annexure A, many of the seals having multiple sides have mercury, venus, mars signature on one side and the omen inscription on the other. For example, in the Mercury concordance seals – 6113-02, 6218-02, 6118-02 are all part of the Mercury Omen series. Similarly, for Venus and Mars, there is a series of multi-sided seals which constitute the Omen series for the planet.

G. Decipherments of key inscriptions to demonstrate the efficacy of the Model

First ever IVC seal discovered – Cunningham Seal # 5084 (IM77)

Reading right to left, the Cunningham seal has the signs for Vernal Equinox (Equinox Sign followed by Sign for ordinal number two), Mercury, Conjunction Sign, Venus Sign, Jar sign.

This is depicting a Mercury-Venus conjunction on the Vernal Equinox day. This is a very rare event that happens once in 60-70 years. We show in a later section of the paper, the archaeoastronomy evidence for the rarity of this event.

H-9 Seal from Harappa

IM #4857 & #9204 depict the same inscription. This seal is an interesting one as it has only 2 signs, the fish sign [#59] and the sign for numeral 7 [#110]. If we apply the same planetary omen methodology, we can conclude that this is another celestial omen. The Old Tamil word for 7 is *Ezhu* and combining it with *Meen* for the fish sign, we get the phrase *Ezhu Meen*. Sangam literature talks about a festival called *Semmeen EzhuMeen Vizhavu* which happens one day prior to the full moon night of the month Tamil month *Margazhi*. This festival is still celebrated in its later Vedic form as *Arudra Darshanam*.

In another case of the deep astronomy of the Harappans, this festival tracks a celestial event called the Occultation. The Moon during its path through the 27 Nakshatras through the month occults 2 of them the most – Antares (*Jyeshta*) & Aldebaran (*Rohini*) – both of them are exactly 180 degrees apart on the ecliptic and both are red (and hence Sem*meen*) as seen by the naked eye.

Jyeshta means the elder or first wife and *Rohini* is considered to be the favorite wife of the Moon. Some researchers have argued that *Jyeshta* was considered to be *Rohini* in the ancient period and this Aldebaran assignment came later (Agashe 1921).

On this *Semmeen EzhuMeen Vizhavu* day, the Moon completes the Occultation of *Rohini* and moves to Betelgeuse in Orion (*Ezhu Meen*). The connection between Orion & Nataraja (Shiva) is well attested (Srinivasan 2006). This day also happens to be very close to the Winter Solstice day which marks the end of the winter. In another use of astronomy for meteorology, the astronomical event associated with this festival is used to predict the rainfall (Sivaprakasam & Kanakasabai 2009).

IM #2863 [Multi-sided Seal] – M-045/DK7991

This interesting multi-sided seal has an inscription on one side. On the other side, there is a person in yogic posture like the proto-siva seal flanked by adorants and a hooded snake.

Using the omen patterns described in the earlier sections, this seal depicts an omen – Vernal Equinox Day Jupiter Venus Conjunction Celebration (a good omen). This seal text is included in Annexure A.

IM77 #4171

As mentioned in Table 1 earlier, Parpola (1994) has identified this sign sequence [Sign #59 and Sign #109] as Pleaides/*Krittika*. Applying the omen patterns, this sequence represents the *Karthigai* festival which is celebrated to this day on the full moon day of the Tamil month of *Karthigai*. And since it doesn't have the lance sign, it is a good omen. We are not arguing that the celebration is being done in the exact same way, but the day has been celebrated for 1000s of years. The festival is mentioned in the Sangam literature *Aka Nanuru* verse 141.

This is another example of the Bilingual Parallels. The root word for the Sanskrit word *Krittika* is Krtt which means to cut. How did pleaides get connected to cut? Due to the rules of Tamil

grammar, the word *āRu meen* is also pronounced aru *meen* – that is the long ā becomes a short a. The word aRu with the short a sounds like the tamil word for cut – aRu, the R is the aspirated *r*. Parpola has also not explained what is the meaning of the seal. Given the high context nature of the inscriptions and the concept of an omen list, this sign sequence represents the *Karthigai* Festival which is still being celebrated on the full moon day of the Tamil month of *Karthigai*. *Akananaru* verse 141 has a clear reference to this festival.

Using the omen patterns, we can surmise that there may also be bad omens associated with *Krittika*. Sure enough, IM77 seal numbers #4256, #4377 and #4490 have the lance sign #211 following #59 and #109. These are bad omens of *Krittika*.

132 full and partial decipherments

In a similar manner, we have fully (marked in Green) and partially deciphered (marked in yellow) 132 inscriptions and provided them in Annexure A.

H. Proposed ritual/religious function for the Great Bath in Mohenjodaro.

The clues lie in the *Maha Maham* festival which is celebrated once in 12 years. References to the festival date back to 7th Century CE and to *Bhavishya Purana* (sometimes dated to the early CE). Selvakumar & Dr. Thangarasu (2017) cite the actual verses from *Appar* (a 7th Century CE Shaivite Saint). And they also mention an inscription that mentions King Krishnadevaraya's visit to the festival in 1445 CE. Given that this festival is 1000+ years old, it is probably safe to assume that it is a continuing tradition from the ancient past. Some key aspects of the *Maha Maham* festival that show the strong substratum influence:

1. This duodecennial festival celebrates the return of Jupiter (instead of Venus) to Leo every 12 years. The switch from Venusian to Jovian covered in prior sections explains this switch.
2. 12 Shaivite Deities (idols) from nearby temples also take the holy dip in the *Maha Maham* tank on this special day (The Hindu 2019). The unmistakable connection of the number of deities (12) to Jupiter's Duodecennial cycle.
3. *Maha Maham* is celebrated once in 12 years, when Jupiter is in Leo, Sun in Aquarius, Moon in Magha Nakshara which is in Leo (refer Table 2). Harappan Octennial is celebrated, as we have shown already, when Venus is in Leo, Sun is in Leo, Moon is in *Dhanishta* which is in Aquarius (Table 2). The parallels between the two are clear.
4. There are also 21 wells which are believed to bring the water from all the important rivers from all of India on this important day. Hindus believe taking a holy dip on this day absolves one of all the sins. The unmistakable connection to water & rivers and hence to Venus (including the many references in Sangam literature mentioned earlier in this paper). Though Venus has been replaced by Jupiter, the connection to rivers and water has been retained. The holy dip ritual takes place between 12 noon and 1 pm on the appointed day, which brings the Sun into the religious picture.

Many historians have hypothesized that the Great Bath is connected to the IVC religion. We propose that the Great Bath is the likely venue of this Venus Octennial Festival because of the following reasons:

1. The Great Bath has 8 bathrooms – unmistakable connection to the Octennial, and to bathing (water). The bathrooms have many markers signifying a ritualistic purpose:

   Wheeler (1966): *Further north, across a lane, was a block which included eight small bathrooms arranged in 2 rows on each side of a passage along which ran a drain. These bathrooms, 9.5'X 6', had been carefully and solidly built, with finely jointed brick floors, drained by runnels communicating with the main drain in the passage. Every room, in spite of its minuteness, contained a brick staircase, which, in view of the thickness of the walls, led probably to an upper storey rather than merely to the roof. The doorways were disposed so that none opened opposite any other, thus securing privacy. The whole structure suggests an extension of the function of the adjacent Great Bath; the excavator was inclined to regard it as having 'provided for the members of some kind of priesthood'.."*

   Intriguingly, not only did they not open opposite any other, each one had a built-in private staircase to an upper storey, which may have had a private dressing area. Males typically don't need this level of privacy. That may point to 8 high-status women who took their ritual bath in these bathrooms. Maybe they were the 8 high priestesses of the Venus temples from across the IVC?

2. Another important structure to the west of the Great Bath, which has been deemed a granary by Wheeler (1996), may be another religious structure. Possehl (2002) has already rejected the Great Granary hypothesis of Wheeler. It has an interesting configuration of 27 blocks which are arranged along 3 columns, each containing 9 rows in a grid pattern with passages separating each block from the other (Wheeler 1966, Fig. 9; reproduced as Fig. 8 in the next page).

3. Within each of the 3 columns, the blocks have very similar size and shape. Perhaps these are altars/shrines for the 27 Nakshatras of the Nakshatra calendar? The 9 rows and 3 columns, maybe the 9 Veedhis & 3 constellations configuration mentioned in Varahamihira's Brihatsamhita? (1884 translation):

   The ecliptic is divided into nine divisions known as Veedhis (paths). According to some, each division consists of three constellations beginning from Aswini : these divisions are technically known 1. Naga (serpent), 2. Gaja (elephant), 3. Iravata (the divine elephant or serpent), 4. Vrishabha (bull), 5. Go (cow), 6. Jaradgava (old ox), 7. Mriga (deer). 8. Aja (ram), 9. Dahana (fire).

   Every month, the moon traverses the 27 Nakshatras and each Nakshatra has been split into 4 parts called 4 Padhas (4 feet or 4 steps). All the blocks have 4 corners, which gives 108 corners (27 blocks times 4 corners). Each block may have had 4 idols or 4 altars giving rise to 108, which is a very important number in Hinduism even today. There are many fanciful theories for the number 108, but this one from the moon's trajectory is the simplest and possibly the most accurate one.

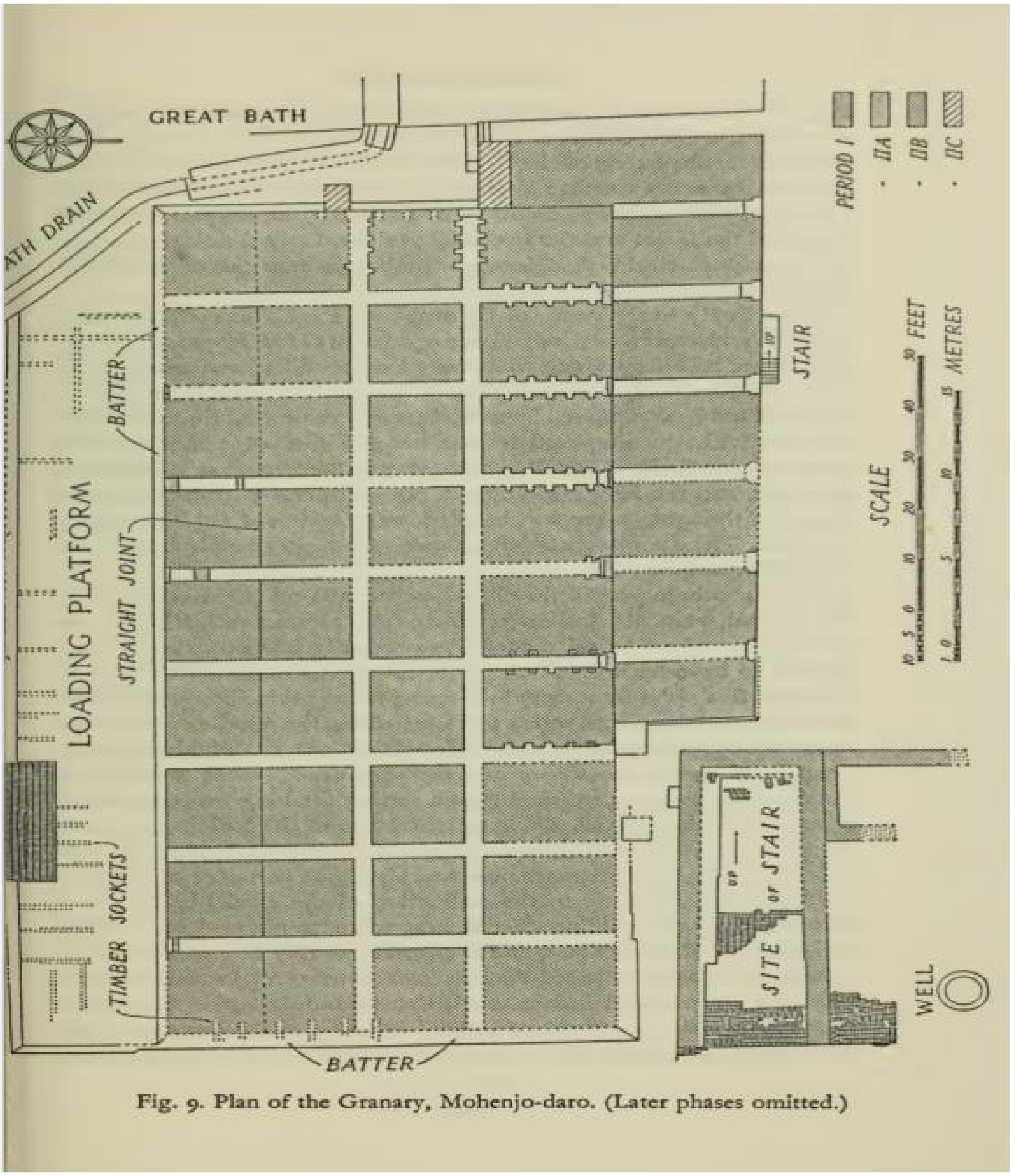


Fig. 9. Plan of the Granary, Mohenjo-daro. (Later phases omitted.)

Fig. 8

We propose that this is the Great Temple of the Moon & the 27 Nakshatras.

4. The College of Priests, as it is being called by historians, could be another important structure pertaining to this Octennial festival. It is said to be a single structure with 78 rooms (Ramzy 2015). The structure is also said to have 13 windows (Kenoyer 2005). Harappans have left us 2 important clues to indicate the connection to Venus – 78 rooms and 13 windows.

The significance of 13 - in an impressive bit of astronomy, the Harappans were able to calculate the epicyclical period of Venus:

- On the day of the Octennial, the Sun would have completed 8 cycles to return to the same point in the sky (geocentric theory) in 8 years. In the same 8-year period, Venus returns to the same spot in the sky after completing 5 cycles. Each solar cycle is a 365-day period.Wwhat is the equivalent for Venus? And that is simply (5x365)/8 = 228, which is very close to the epicyclic period. This is another important piece of evidence that they knew the epicycle model of the geocentric viewpoint. Neugebauer (1975) has a detailed explanation of the epicycle model of the ancients.
- The Sun completes 1 epicycle in 365 days and Venus in 228 days. The ratio of Sun to Venus is 1.6. Therefore, in a 8-year period, Venus will complete simply 1.6 times 8-13 epicycles.
- That explains the connection of 13 to Venus.

The significance of 78 is 13 times 6. The significance of 6 – there are 2 possibilities for this:

a. We can extend the logic of steps or feet like the moon's 4 steps per nakshatra to the Venus trajectory. Fig 4 in this paper shows that each cycle of Venus crosses 6 zodiacs.

b. Hinduism has 6 seasons (not the typical 4 seasons). Obsessive tracking of Venus and its extensive ties to the weather conditions, rainfall, etc. might have led the Harappans to conclude that Venusian movement causes the seasons on Earth. They wouldn't have known about the axial tilt of Earth which is the real cause of the seasons.

There are several Hindu temples which have 108 *lingas*, there are 108 *Vishnu* temples *(Divya Desham* list) etc. This is due to the importance of 108 as explained above. Therefore, a temple with 78 shrines or altars for Venus, which we have shown to be the most important God (actually Goddess) for this festival, is well within the realm of possibility.

We propose that the College of Priests is the Great Temple of Venus.

5. *Dhanishta* is in Aquarius which is connected to water.
6. Mohenjo Daro is a city of wells. It has 700 wells and many more are yet to be excavated. Possehl (2002) quotes Michael Jansen who has studied the city's hydrology extensively. Considering the Great Bath and the number of wells, it could well be called the City of Water (interestingly Kumbhakonam, where the *Maha Maham* festival is held currently, loosely translates to a pot of water. A pot of water, *Kumbham* in Sanskrit, is also the symbol for Aquarius in Hindu astrology). H-182 is from Harappa and the Great Bath is in Mohenjo Daro. There is no Great Bath in any other IVC City. This could mean that people from all over the IVC congregated at the Great Bath to celebrate this important festival by taking the holy dip, much like how people from all over India congregate at the *Mahamaham* tank in Kumbhakonam to take this holy dip?
7. Likely the holy dip during the Octennial Festival took place between 12 noon and 1 pm bringing the Sun into the religious picture.

In sum, we have the Great Bath, where the central tank is open to the sky and to the Sun. And at the solar noon it would be directly over the Great Bath blessing the holy dip. We have shown that there was a Great Temple of the Moon and a Great Temple of Venus. Therefore, in the Great Bath complex, we have a religious festival and a religious temple complex, which connects the 3 brightest heavenly bodies – The Sun, Moon & Venus.

I. Archaeoastronomical evidences to support the hypotheses

Archaeoastronomy for the Venus Octennial Festival Tablet H-182 [IM77 #4306]

As explained in the prior sections of this paper, the Harappans chose the astronomical event of Sun & Venus in Leo and Moon in Aquarius for this Octennial festival. Since the event happens every 8 years, there is no way to pinpoint the exact date on which the Harappans may have started celebrating this festival. However, we want to at least demonstrate the feasibility of such an astronomical event occurring periodically back in the Mature Harappan period.

We chose two periods for our archaoeastronomy analysis:

1. 2600-2550 BCE period, to coincide with the start of the Mature Harappan period. The Great Bath is also dated to approximately the same period, which we have already shown as the venue for this festival.
2. The current period of 2000-2050 CE to confirm that this astronomical pattern is stable across millennia.

We chose two sources of data for our analysis:

1. NASA's JPL has published the ephemeris of the planetary positions from 9999 BCE to 9999 CE available at This is the most authoritative source for astronomers worldwide. [Link in the references section]
2. To get the exact zodiac ingress and planetary positions in the zodiac signs, we identified an authoritative astrological ephemeris, called the Swiss Ephemeris. The Swiss Ephemeris is based on the NASA JPL ephemeris mentioned above and is a key reference resource for astrologers worldwide. [Link in the references section]

From the Swiss Ephemeris, we downloaded and analyzed the ephemeris files for the 50-year period 2600-2550 BCE and the current 50-year period of 2000-2050 CE. To replicate the way the Harappans may have observed this event as it unfolded in that period, we followed the method below:

1. We first keyed into the date of Sun's ingress into Leo, which would have been the beginning of the solar month of Leo.
2. We then checked and confirmed that the Venus position is also in Leo for the same date.
3. From there we located the Moon position during that month in Aquarius and noted down the date.
4. We then scanned the planetary positions to check that the pattern is repeating every 8 years as is predicted by this paper.

It is to be noted that the Swiss Ephemeris planetary positions are for the UTC 00:00 time. We still need to show that the specific configuration would have been visible over the sky at Mohenjodaro, at it's latitude & longitude +68.1357°E, +27.3243°N. For that:

1. We chose morning 5 am (local time at Mohenjodaro) for Sun & Venus because the Harappans may have looked at the heliacal rising. For the moon we used 20:00 (8 pm local time at Mohenjodaro) as the time when the Moon would have most likely been visible.
2. To show that Sun & Venus will be seen together, we need the Right Ascension and Declension of the Sun & Venus at this time.
3. For all the 3 objects, we need the Azimuth & Altitude data to show that they were visible above the horizon in the sky at Mohenjodaro.

We fed these dates & times for Sun & Venus and the Moon with the latitude and longitude of Mohenjodaro, into the Ephemeris generator available at the NASA JPL site mentioned above and generated the specific Ephemeris. We then tabulated all the data obtained into Table 3 given below. For all the 13 Octennial entries, 1 through 6 in the modern period 2000-2050 CE and 7 through 13 in the 2600-2550 BCE period:

1. The Right Ascension & Declension data show that Sun & Venus are seen in the same vicinity at Mohenjodaro.
2. Sun & Venus are both visible in the eastern sky and above the horizon at Mohenjodaro is indicated by the Azimuth and Altitude data. For the Moon, the Azimuth and Altitude data show that the Moon was visible over the horizon in the western sky at Mohenjodaro.
3. The Illumination data for all the entries show that they were clearly visible and close to their full brightness.
4. For the Moon, the Illumination data shows that all the occurrences were close to being a full moon.

Our analysis covers a 50-year period in 2600-2550 BCE & in 2000-2050 CE which are separated by 4,200 years. The data clearly shows that the Harappan Octennial observation has been stable over many millenia, confirming the central hypothesis of this paper about H-182.

Archaeoastronomy of the Cunningham Seal [Fig 1]

Cunningham seal shows a Mercury-Venus conjunction on the Vernal Equinox day as explained in prior sections of this paper. To prove this event, we first had to find the correct date of the vernal and autumnal equinox from 2600 to 2500 BCE. We decided to use the Julian calendar as that proleptic calendar was what was used in ancient times.

First, we had to convert the current dates of the vernal and autumnal equinox from Gregorian to Julian. For example, March 20 in Gregorian is March 7 using the Julian calendar. However, due to the precession of days, we had to convert this date to the correct time, 4500 years ago using a conversion calculator. The Julian precession is 3 days every 400 years, meaning 34 or 35 days after the current equinox. Counting back from March 7 led us to the date of April 12 for vernal and Oct 13/14 for autumnal. We double-checked our answers using a research engine named Wolfram Alpha that calculates specific dates and times in ancient times.

Octennial #	Date CE/BCE YYYY-MM-DD	Object (Sun & Venus in Leo, Moon in Aquarius)	Deg min sec at Time UTC 00:00	Time at Mohenjadaro	Right Ascension	Declination	Azimuth	Altitude	Illumination%
1	CE 2003-08-01	Sun	8°21'42"	5:00	08 43 57.14	+18 07 20.0	96.3025	53.5107	100.00000
	CE 2003-08-01	Venus	3°28'	5:00	08 25 04.23	+20 12 27.6	95.6265	58.4182	99.63078
	CE 2003-08-11	Moon	2°40'	20:00	21 11 43.60	-22 00 50.1	192.167	39.710	99.57792
2	CE 2011-08-01	Sun	8°26'07	5:00	08 44 14.91	+18 06 02.0	96.3338	53.4989	100.00000
	CE 2011-08-01	Venus	4°10'	5:00	08 27 57.07	+20 04 01.8	95.4885	57.7959	99.71512
	CE 2011-08-13	Moon	10°44'	20:00	21 28 19.62	-10 51 02.8	192.499	51.0517	99.88684
3	CE 2019-08-01	Sun	8°29'18"	5:00	08 44 27.79	+18 05 08.8	96.3568	53.4934	100.00000
	CE 2019-08-01	Venus	4°50'	5:00	08 30 45.14	+19 55 45.4	95.3480	57.1773	99.7881
	CE 2019-08-14	Moon	4°13'	20:00	21 08 45.63	-19 27 36.2	197.5445	41.3181	99.46249
4	CE 2027-08-01	Sun	8°33'29"	5:00	08 44 44.87	+18 04 06.9	96.3828	53.4858	100.00000
	CE 2027-08-01	Venus	5°31'	5:00	08 33 36.86	+19 47 11.5	95.2163	56.5576	99.84932
	CE 2027-08-16	Moon	8°41'	20:00	21 22 18.28	-15 15 42.0	197.4672	45.7079	99.76549
5	CE 2035-08-01	Sun	8°37'12"	5:00	08 44 59.66	+18 02 53.9	96.4115	53.4738	100.00000
	CE 2035-08-01	Venus	6°12'	5:00	08 36 25.57	+19 38 15.7	95.0942	55.9348	99.89878
	CE 2035-08-17	Moon	0°56'	20:00	20 50 15.99	-15 57 39.1	208.399	41.910	98.46476
6	CE 2043-08-01	Sun	8°40'56"	5:00	08 45 15.02	+18 02 06.5	96.4316	53.4682	100.00000
	CE 2043-08-01	Venus	6°53'	5:00	08 39 15.59	+19 29 30.7	94.9671	55.3138	99.93693
	CE 2043-08-19	Moon	6°2'	20:00	21 21 05.10	-19 48 54.6	199.820	40.400	99.07963
7	BCE 2599-08-16	Sun	0°51'26"	5:00	08 13 31.73	+20 22 40.7	93.1517	55.0408	100.00000
	BCE 2599-08-16	Venus	3°28'	5:00	08 41 08.64	+20 11 23.4	90.0499	48.850	99.38817
	BCE 2599-08-17	Moon	7°38'	20:00	21 23 48.12	-17 19 24.8	168.4657	44.5836	98.23934
8	BCE 2591-08-16	Sun	0°55'10"	5:00	08 13 47.45	+20 21 58.6	93.1702	55.0356	100.00000
	BCE 2591-08-16	Venus	7°49'	5:00	08 43 56.69	+20 00 26.1	90.0183	48.2253	99.26819
	BCE 2591-08-18	Moon	1°0'	20:00	20 55 54.40	-20 23 26.6	179.296	42.2819	99.58774
9	BCE 2583-08-16	Sun	0°58'26"	5:00	08 14 00.76	+20 20 59.0	93.1982	55.0314	100.00000
	BCE 2583-08-16	Venus	8°30'	5:00	08 46 42.20	+19 49 01.5	89.9958	47.6008	99.13675
	BCE 2583-08-20	Moon	5°30'	20:00	21 06 38.33	-14 00 58.2	178.222	48.6428	99.30115
10	BCE 2575-08-15	Sun	0°2'24"	5:00	08 10 07.70	+20 33 35.4	92.8731	55.1368	100.00000
	BCE 2575-08-15	Venus	7°55'	5:00	08 44 20.59	+19 58 38.6	89.6175	47.3527	99.05527
	BCE 2575-08-22	Moon	9°52'	20:00	21 35 42.83	-20 06 15.5	171.817	42.1617	98.7453
11	BCE 2567-08-15	Sun	0°6'13"	5:00	08 10 23.37	+20 32 30.7	92.9019	55.130	100.00000
	BCE 2567-08-15	Venus	8°36'	5:00	08 47 07.32	+19 47 07.5	89.5980	46.729	98.90677
	BCE 2567-08-23	Moon	2°54'	20:00	20 57 41.38	-13 00 45.3	186.159	49.467	99.71238
12	BCE 2559-08-15	Sun	0°9'05"	5:00	08 10 35.43	+20 31 58.8	92.9174	55.1279	100.00000
	BCE 2559-08-15	Venus	9°16'	5:00	08 49 50.80	+19 35 55.6	89.5688	46.1079	98.74639
	BCE 2559-08-25	Moon	10°31'	20:00	21 44 38.43	-19 36 59.4	172.796	42.7456	98.88687
13	BCE 2551-08-15	Sun	0°12'58"	5:00	08 10 51.60	+20 31 03.5	92.9426	55.1225	100.00000
	BCE 2551-08-15	Venus	9°57'	5:00	08 52 37.32	+19 24 09.9	89.5504	45.4854	98.57551
	BCE 2551-08-26	Moon	6°12'	20:00	21 19 05.71	-13 19 36.8	182.729	49.310	99.66935

Table 6

Next, we had to find the dates of Mercury-Venus conjunctions. Using a Swiss Ephemeris dating back to the time we needed, we found many pages of tables including every major celestial body and their Zodiac during that period. After filtering out Mercury and Venus, we derived a list of all the dates when their Zodiacs were the same. Then we filtered it further to the dates that matched the dates of the vernal equinox. This narrowed it down to 5-6 instances where they overlapped. To ensure that this conjunction was visible over Mohenjodaro as that was our focus area, we needed to use the NASA ephemeris.

The NASA Ephemeris gave us the Right Ascension, Declension, Azimuth, Altitude, and Illumination of both Mercury and Venus. We developed a Python program [Link provided in the references section] to determine the angular separation and visibility using those data points for both planets. The program would look for angular separation of 3 degrees or less and high illumination of the planets to ensure we obtained accurate data points. This would guarantee visibility and a decent conjunction.

To check all of the work, we used an ephemeris search engine called Astroseek [Link provided in the references section] to give us all the days of future and present-day conjunctions for Mercury and Venus. We used the period of 50 years between 2550 BCE-2500 BCE to calculate our data. In the ephemeris, we selected Mercury and Venus with a conjunction of less than 3 degrees. This generated around 100 results, but after screening again for our equinox dates, there were only 20 dates that matched the criteria. If both our derived dates and the Astroseek dates were the same, then if would ensure that there was a valid conjunction. We ran these dates through the program and determined that they guaranteed our results. Lastly, we organized all of this information into a table [Table 7 below] for easy access and understanding.

Archaeoastronomy method to create a prototype Harappan Celestial Omens List

We used the Swiss Ephemeris to build a list that covers the transits of all the planets & *Rahu* (Lunar Asc Node), conjunctions, triple conjunctions, the planetary positions on the 2 Equinox & 2 Solstice days. We built the prototype omens list for 4 periods:

a. 2599 BCE-2550 BCE – Mature Harappan Period Excel File A [MHPA]

b. 2550 BCE-2500 BCE – Mature Harappan Period Excel File B [MHPB]

c. 2000 CE -2050 CE - Modern Period Excel File A [CEPA]

d. 2050 CE. -2100 CE – Modern Period Excel File B [CEPB]

We included the Modern period also to show that the astronomical events tracked by the Harappans persist over millennia. It is also easier to do quality checks for the modern period using the many tools available on the web. The links to all the 4 files are available in Annexure A.

A few examples to show the efficacy of the Prototype Omen List:

I. Cunningham Seal [Fig 1] – In the MHPA file [Links provided in the reference section] Apr 12, 2567 BCE [row number 1745] shows a Mercury Venus Conjunction on Vernal Equinox day which corresponds to the Cunningham Seal.

II. H97-3433/7617-01 [Fig 1] – This seal shows a triple conjunction of Mercury-Venus-Jupiter. In the MHPA file there are 2 dates on which this event happened – November 10, 2596 BCE [row number 273] & February 7, 2581 BCE [row number 1008]. This event doesn't occur at all in the period covered by MHPB.

In a similar manner, for all the seals which have been deciphered, the corresponding entries can be found in MHPA and/or MHPB, thereby demonstrating the scientific validity of the Harappan Celestial Omens using Archaeoastronomy techniques.

Seq No	Equinox Type	Year	Month	Day	Planet	Righht Ascencion	Declension	Azimuth	Altitude	Angular Separation	Conjunction(Yes/No) According to Python output
1	Vernal	2503 BCE	April	12	Mercury	00 14 02.39	-02 18 29.1	140.234722	53.286923	1.88	yes
2	Vernal	2503 BCE	April	12	Venus	00 13 37.78	+00 11 11.4	137.886351	55.374944	1.88	yes
3	Vernal	2503 BCE	April	12	Mecury	00 14 28.38	-02 19 40.7	141.473963	53.762534	2.54	yes
4	Vernal	2503 BCE	April	12	Venus	00 18 02.55	+00 42 15.2	137.171125	55.718661	2.54	yes
5	Autumnal	2505 BCE	October	13	Mercury	13 08 10.92	-07 51 08.4	136.924524	44.830105	3.29	no
6	Autumnal	2505 BCE	October	13	Venus	13 19 09.67	-08 00 52.4	134.130365	42.995284	3.29	no
7	Autumnal	2516 BCE	October	13	Mercury	14 37 33.49	-18 02 53.9	126.023192	22.246269	4.48	no
8	Autumnal	2516 BCE	October	13	Venus	14 24 36.93	-15 16 18.3	125.985487	26.407352	4.48	no
9	Autumnal	2533 BCE	October	13	Mercury	12 11 00.40	+01 18 45.2	146.501204	59.724077	56.61	no
10	Autumnal	2533 BCE	October	13	Venus	15 42 02.98	-23 32 05.2	120.609098	6.295097	56.61	no
11	Vernal	2008 CE	March	20	Mercury	22 40 22.98	-10 44 17.4	151.802185	47.772761	1.14	yes
12	Vernal	2008 CE	March	20	Venus	22 44 11.76	-09 22 33.1	149.637518	48.581183	1.14	yes
13	Vernal	2008 CE	March	21	Mercury	22 46 09.73	-10 12 43.7	150.854892	48.051085	2.80	yes
14	Vernal	2008 CE	March	21	Venus	22 48 51.93	-08 55 49.1	149.085893	48.894826	2.80	yes
15	Vernal	2018 CE	March	20	Mercury	00 55 46.69	+09 10 09.4	99.37227	36.829333	3.87	no
16	Vernal	2018 CE	March	20	Venus	01 01 54.61	+05 36 35.2	102.326529	33.80064	3.87	no
17	Vernal	2018 CE	March	21	Mercury	00 56 43.35	+09 24 56.4	99.524602	37.599535	4.09	no
18	Vernal	2018 CE	March	21	Venus	01 06 27.64	+06 06 48.7	101.707998	33.913768	4.09	no
19	Vernal	2048 CE	March	20	Mercury	23 04 06.66	-08 26 34.3	142.988363	47.08867	1.88	yes
20	Vernal	2048 CE	March	20	Venus	22 56 34.83	-08 11 52.3	145.148425	48.27852	1.88	yes
21	Vernal	2048 CE	March	21	Mercury	23 10 24.57	-07 46 59.7	141.738383	47.320918	2.28	yes
22	Vernal	2048 CE	March	21	Venus	23 01 13.64	-07 44 20.5	144.566329	48.581408	2.28	yes
23	Vernal	2069 CE	March	20	Mercury	00 11 39.72	+00 00 46.4	117.447596	41.757754	0.37	yes
24	Vernal	2069 CE	March	20	Venus	00 10 47.76	-00 19 02.3	117.974845	41.724145	0.37	yes
25	Vernal	2069 CE	march	21	Mercury	00 18 47.61	+00 56 02.8	115.818326	41.684441	1.14	yes
26	Vernal	2069 CE	March	21	Venus	00 15 20.73	+00 11 19.5	117.314794	41.916924	1.14	yes
27	Vernal	2069 CE	March	20	Mercury	00 11 39.72	+00 00 46.4	117.44763	41.757786	0.37	yes
28	Vernal	2069 CE	March	20	Venus	00 10 47.76	-00 19 02.3	117.974879	41.724177	0.37	yes
29	Vernal	2069 CE	March	21	Mercury	00 18 47.61	+00 56 02.8	115.818359	41.684474	1.14	yes
30	Vernal	2069 CE	March	21	Venus	00 15 20.73	+00 11 19.5	117.314828	41.916956	1.14	yes

Table 7

Conclusion

We have shown through a methodical approach, described in this paper, the following:

1. We have fully deciphered 69 inscriptions and partially deciphered 63 inscriptions including some important inscriptions, like the tablet H-182 there by opening a new front in the overall decipherment initiative.
2. That the Harappans were the original creators of the Star Charts and that they knew the key concepts of Metonic Cycle, Saros Cycle, Eclipse Cycle, Venus Octennial Cycle, 19-year Grand Cycle of Venus, many of which we still follow in the modern day.
3. Uncovered the Harappan meteorological methods which used Venusian movements in the sky and the nesting behaviors of snakes.

4. Used archaeoastronomy techniques to show that the Harappan observations are astronomically feasible and are stable over several millennia.
5. Explained how the Harappan system amalgamated with the Vedic system to form the later day Hindu system which is still in vogue.
6. Solution to the riddle of the Great Bath to be the venue of the Venus Octennial Festival and that the Great Bath is part of a larger religious complex consisting of temples for the Moon, the 27 Nakshatras and Venus.

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Python program used for Cunningham Seal conjunction calculations

In Annexure A

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ANNEXURE A

The concordance files for the 6 planets (including the file included in this Annexure A) and the 4 files of the prototype celestial omens list are available at the link:

https://suqumar.github.io/IVC-Harappan-Celestial-Omens-List-Paper/

Data and Decipherment: Computational Approaches to Indus Writing

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Computational Epigraphy Lab (iCEL)
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"A race of hyperintelligent pan-dimensional beings once built themselves a gigantic supercomputer called Deep Thought to calculate once and for all the Answer to the Ultimate Question of Life, the Universe, and Everything.

For seven and a half million years, Deep Thought computed and calculated, and in the end announced that the answer was in fact Forty-two and so another, even bigger, computer had to be built to find out what the actual question was."

-Douglas Adams, The Hitchhiker's Guide to the Galaxy series

Among the remarkable changes that the world has seen over the (little more than a) century following the announcement in 1924 of the discovery of the Indus Valley Civilization [Marshall 1924], probably the most relevant from the perspective of the authors is the Information Revolution. This phenomenon, which is still ongoing, came about as a result of the development – and mass adoption – of the digital computer, and subsequently, the ability to rapidly communicate and share information worldwide made possible by the internet. Even more remarkably, the recent advances in creating Large Language Models (LLMs) has transformed and challenged the traditional models of education and research, even if one accepts that general purpose machine intelligence could be some way off. Given their impact on society in general, it's no surprise that such software have been touted as a "magic bullet" for solving the Indus Puzzle, viz., deciphering the inscriptions that have been excavated in the sites associated with the mature phase of the Indus Valley Civilization (IVC, 2600-1900 BCE). So, is the solution of the puzzle just around the corner?

The lack of any knowledge about both the nature of the writing system, as well as, the possible language or languages that could have been expressed using the symbols, have foiled the hundreds of attempts that have been made to decipher the inscriptions ever since Marshall's announcement of the existence of a "pictographic language" on the Indus artefacts. The large

number of distinct symbols – between four hundred to eight hundred, depending on how one identifies allographs – have suggested to many serious scholars that it was likely to have been a logo-syllabic script. An example of such a system is the cuneiform script used for writing Sumerian in the city-states of Mesopotamia. Note that the people of Indus civilization had trade connections with the Sumerians as attested by archaeological discoveries in Sumerian sites of artefacts characteristic of the Indus Valley Civilization, such as seals, beads and pottery.

Nevertheless, it has not prevented assertions that the inscriptions are written using an alphabetic system. Alphabets typically use about thirty symbols (the Glagolitic script, the oldest known Slavic alphabet, at one time had 41 distinct letters, which is possibly the largest among true alphabets – i.e., alphabets that explicitly represent both vowels and consonants using distinct symbols, in contrast to consonantal scripts or abjads where letters represent consonants with vowel sounds implied, and alpha-syllabaries or abugidas where consonant-vowel combinations are represented using distinct graphemes with the vowel modifier typically indicated by diacritics).

Thus, such claims often go to absurd lengths to demonstrate that the hundreds of distinct graphemes in the Indus inscriptions are somehow reducible to combinations of just a few dozen symbols. While, in principle, it's possible that elements of the Indus signary could have been used to write phonetically, as is the case for Egyptian hieroglyphic writing, especially for rendering names that are foreign to the primary users of the script and hence cannot be rendered using logograms – very often such attempts culminate in reading the inscriptions in languages that were present only after the end of the IVC. One of the authors has had the dubious pleasure of being asked to review for a scholarly journal a manuscript that seriously proposed a reading for Indus inscriptions that jumped between four different Southern Indian languages of the present day, while others have claimed to have read the inscriptions as Sanskrit (the earliest form of which, Vedic Sanskrit, can be dated only as far back as 1500 BCE).

Returning to the theme with which we began, the past few years have already seen several attempts to use "Artificial Intelligence" (AI) to achieve success in an endeavour that humans have so far failed in. Unfortunately, the combination of algorithmic routines that are highly prone to hallucinations (repeatedly giving outputs of made-up "facts") and the natural imbecility of humans who arrogantly believe that they can solve a problem without having the slightest knowledge of the origin and evolution of different types of writing systems, has only resulted in an accelerated pace with which new claims of decipherments of the Indus inscriptions are being made. The great confidence with which some have asserted that AI is a game-changer for solving the Indus puzzle is somewhat reminiscent of an episode from Douglas Adams' The Hitchhiker's Guide to the Galaxy series (see the opening quote of this article): the most powerful computer ever to be built is asked the question of "Life, the Universe and Everything" and after processing information for an extremely long time, gives the answer "42". The absurdity of the answer of course, arises from the fact that the answer does not make sense without a good understanding of the context of the question that it is the answer to. We would like to argue that much of the effort in applying computational methods to try deciphering the Indus inscriptions may give rise to similar non-sensical results, if these exercises are carried out without any appreciation of why the problem has resisted attempts to solving it for so long.

It is sobering to realize that despite a hundred years' worth of effort, the actual confirmed knowledge about the Indus inscriptions has not moved all that much beyond what was stated in the observations made by Marshall in his 1924 article about the "seals... inscribed with legends in an unknown pictographic script" [Marshall 1924]. Among the "points ...worthy of remark" on the "strange pictographs which do duty for letters", Marshall had suggested quite intriguingly that "the marks... attached to many of the pictographs" were "apparently vowel signs". We are unsure on what basis Marshall stated this, but it could be that he had in mind the method of using diacritics to indicate the vowel used to modify consonants in Indic scripts, even though he went on to say that the signs "bear no resemblance whatever to any ancient Indian alphabet".

It is also possible that Marshall was hinting at the use of signs as phonetic markers or determinatives (to indicate the specific meaning) for a logogram that could not be uniquely interpreted otherwise. If this interpretation is correct, it could be quite prescient, as such use of signs to modify logograms have been seen in all the ancient writing systems of the Old World, including Sumerian cuneiform, Egyptian hieroglyphs and Chinese writing. Marshall also mentions a possibility that the civilization originated "further west", possibly meaning Elam, and as a supporting argument states that "there are linguistic reasons for believing that it was by way of Baluchistan that the Dravidian races... entered India". Note that the relation suggested here between ancient Elam and Dravidian predates by almost half a century the Elamo-Dravidian hypothesis proposed by David McAlpin in the 1970s [Renfrew 1989]. In fact, the resemblance of the Indus seals to Proto-Elamite tablets were pointed out within a week of publication of Marshall's article by the British linguist Archibald Sayce, the author of the first grammar of Assyrian in English [Sayce 1924], and the week after that by Cyril Gadd and Sidney Smith, both pioneers of Mesopotamian studies in the United Kingdom [Gadd 1924] in the pages of the same magazine.

Even more humbling is a study of the Indus inscriptions by G R Hunter that was submitted to the University of Oxford for the degree of Doctor of Philosophy in 1929 and that was published as a book a few years later [Hunter 1934]. It contains the first ever concordance compiled from all the known inscriptions at the time and remained the only corpus in existence till Mahadevan created a digital database in the 1970s.

Many of the conclusions drawn by Hunter based on painstaking manual analysis of the inscriptions, e.g., that most of the inscriptions were written from right to left, or that the patterns of sign co-occurrences of the seals have distinct characteristics, with those found in South Asia differing significantly from those found in West Asia, have later been supported by computerized analysis of sequence statistics performed on much larger corpora [Rao 2009, Ashraf 2018]. Given these insights obtained from an intense analysis of the structure of the inscriptions, some have gone to argue that the discovery of bi--lingual or multi-lingual inscriptions with Indus signs occurring in one of them, is all that is needed to decipher the script. Such an object(s), it is argued, will play the same role as the Rosetta stone in deciphering Egyptian hieroglyphs. Named after the town of Rashid or Rosetta in Egypt, where it was discovered in 1799 by Napoleon's army, the Rosetta stone is a stele inscribed with three versions of a decree, one in hieroglyphic, another in demotic and the third in Greek that was

inscribed in 196 BCE during the Ptolemaic dynasty of Egypt. As Greek was a known language, the stone proved instrumental in allowing Young and Champollion to make breakthroughs in deciphering ancient Egyptian writing.

Unfortunately, in the case of the Indus inscriptions, just the discovery of multi-lingual inscriptions is unlikely to be sufficient in enabling their reading. What is often missed in accounts of the Rosetta stone is that even after its discovery, it took more than two decades of work before hieroglyphics could be deciphered. This is because it is crucial to have a correct idea of the language of the script (which Champollion correctly surmised must be related to Coptic, the liturgical language used in Egyptian churches) that we are trying to decipher. To demonstrate this, we show in Figure 1, a bilingual inscription written in English and Chinese (Mandarin). In the absence of any knowledge of the Chinese language, the reader would be hard put to link the graphemes of the two inscriptions and thus, will be unable to "decipher" Chinese. As Michael Coe points out, while giving the specific example of Etruscan, whose writing system is known while the language is unknown, "No script has ever been broken, that is, actually translated, unless the language itself is known and understood" [Coe 2012]. The problem is compounded when the nature of the writing systems used for writing the different scripts in a multi-lingual inscription are different. For example, of the two scripts shown in Figure 1, English is a pure alphabet while Chinese is an ideographic system, making any mapping between segments of the two inscriptions based on their relative length quite problematic.

In fact, even if the two scripts had both been alphabetic, we would have to correctly infer the possible language which the unknown alphabetic system has been used to write – so as to be able to assign sound values. A toy example can be shown using a well-known work of fiction, viz., The Adventure of the Dancing Men, written in 1903 by Arthur Conan Doyle, in which a gentleman seeks the aid of Sherlock Holmes in figuring out why (what he believes to be) a series of childish stick-figure drawings (Figure 2) is terrifying his American wife, Elsie. As Elsie refuses to explain the reason for her reaction to these figures, Sherlock Holmes has to solve the mystery by working out the meaning of the various sequences of stick figures.

Holmes is able to deduce that the figures represent a substitution cipher and is able to read the messages by assuming it to be in English and then mapping the different stick figures to their sound values through a combination of frequency analysis (e.g., the most frequently occurring stick figure is likely to represent "e", the commonest letter in the English alphabet) and completing partially reconstructed words to express known proper names such as "Elsie". While it may seem that Holmes was rather lucky in being able to decrypt the messages from a relatively small number of samples, one should note that in recent times, Markov Chain Monte Carlo (MCMC) method has been used to break such ciphers rapidly from small samples by efficiently searching the space of all possible solutions for the most likely plain text message.

While deciphering inscriptions rendered in an extinct writing system is quite different from trying to decrypt an encoded message, it may be instructive to note that similar frequency-based techniques were sought to be employed in actual decipherment exercises – most notably, by James Prinsep (see Figure 3) in his eventually successful bid to decipher Asokan Brahmi

inscriptions. In principle, one can conceive of a situation in which, faced with what one believes to be an alphabetic system, the underlying language can be correctly guessed and for which there is a reasonably large number of written texts so that the frequency distribution of various sounds can be robustly inferred.

In such a scenario, it is plausible that the MCMC method can map the graphemes of the unknown alphabet to their appropriate sound values. Thus, had Brahmi still been undeciphered today, an inspired guess that the inscriptions could be in Pali Prakrit could have been sufficient to be able to decipher Brahmi, provided a sufficiently large Pali corpus was already available. However, a note of caution is in order here. Brahmi, like the Indic writing systems that followed it, is an alphasyllabary rather than a pure alphabet, and thus the number of distinct graphemes, that comprise both pure consonants as well as various consonant-consonant and consonant-vowel combinations (and occasionally, consonant-consonant-vowel, as well as, consonant-consonant-consonant conjuncts) can be as many as a couple of hundreds.

The size of data sets required to robustly infer the frequency values for such a large number of signs would correspondingly need to be quite large – unless one is able, like Prinsep, to work out the marks made on a consonantal sign to indicate each of the vowel inflections. The situation would naturally be compounded in the case of a logo-syllabic script with its many hundreds of distinct graphemes. Thus, it is crucial that any attempt at deciphering Indus inscriptions first correctly infer the underlying language, in order to be able to make any progress in reading it.

As should be evident by now, we strongly believe that a brute force approach to using computational tools to decipher scripts is bound to fail without an appreciation of the possible varieties of writing systems – that have both phonographic and logographic aspects (see Figure 4) – and their corresponding features.

This is particularly the case when occasionally claims are made about the Indus inscriptions not being writing at all. While non-linguistic sequences certainly do occur, some of them (such as musical scores) can only arise in cultures that are deeply steeped in the tradition of writing so that the concept of representing speech visually can be abstracted to the point where even sounds without an articulated meaning (such as in music) can be symbolically represented on paper. Furthermore, while it is probably impossible to prove that a set of inscriptions is writing without actually deciphering them, if there is evidence of structural organization in such symbolic sequences – such as the occurrence of clusters of signs that are seen to occur frequently as sub-sequences in longer inscriptions – then its interpretation as some form of writing would seem to be the simplest hypothesis in the sense of requiring the least number of additional assumptions (the Occam's razor principle). After all, "peoples around the world on similar levels of cultural complexity have come up with extraordinarily similar institutional responses when faced with similar problems – for example, the invention of hieroglyphic writing systems as an answer to the needs of nascent political states" [Coe 2012].

Thus, the archaeological evidence of a complex society with extensive trading networks, that would have required some form of long-distance communication robust to noise and the means to reliably keep accounts and store records, suggests that the weight of evidence favours the Indus inscriptions to be some form of writing.

At the Computational Epigraphy Lab (iCEL) in the Institute of Mathematical Sciences (IMSc), Chennai, we have embarked on a program of data analytics-based approach to understanding writing systems in general, with a special focus on the Indus script. Using initially the corpus compiled by Iravatham Mahadevan, and subsequently the corpus curated by Bryan Wells (the early version of which was in fact compiled at IMSc when Dr. Wells was a postdoctoral fellow there), we have compared the features of the Indus writing system with other systems around the world, both ancient and modern. One of the most promising techniques developed is the unsupervised segmentation of linguistic sequences based on sign co-occurrence statistics. In early work [Sinha 2011] we had used sign pair statistics, identifying signs that occur together much more often than would be expected had they occurred next to each other only by chance (e.g., given their individual occurrence probability in the corpus). This allowed us to merge sign clusters into larger and larger meta-symbols representing multiple co-occurring signs. Once it reduces the entire string to a single meta-symbol,- we invert the sequence to obtain the segmentation tree for the sequence, allowing us to see if the sequence (let's call it the "sentence") is built out of several sub-sequences (in this context, "words"). In subsequent work [Ashraf 2019], we have extended the analysis to include correlations that go beyond just a pair of signs.

By considering the most frequently occurring statistically significant sign clusters, and arranging them so as to align the sequences with the cluster functioning as the anchor (see Figure 5), we see that many of the Indus inscriptions are composed of relatively independent segments. By lining up these segments below one another, we can identify related graphemes that are linked to each other in terms of occurring in the same or similar contexts. An example is shown in Figure 5, where we see that two graphemes (lozenge in an oval and lozenge in a diamond) that are considered to be identical in the Mahadevan sign list but that are considered to be distinct by Bryan Wells, are most likely just allographs. By coupling such results with other features of the artefacts, such as their place of discovery, the material on which they are inscribed, etc. it may be possible to identify certain semantic correlates of the sign clusters.

We are currently in the process of constructing a database of 3-dimensional representations of the Indus artefacts in which these inscriptions appear, to provide material context that was so far absent from the data. We hope that the occasion of the centenary of the announcement of the discovery of the Indus Valley Civilization will enable stakeholders across India and around the world, who are working on different pieces of the Indus puzzle to come together in creating a digital data platform that will make the Indus inscriptions freely available online – along with their entire associated material spectrum – providing much needed context. Only by ensuring unimpeded access to the original source material to the public at large can we ensure that the next breakthrough will occur sooner rather than later.

Acknowledgments

We would like to thank the various collaborators and scholars who have enhanced our understanding of the "Indus puzzle" over the past one and half decades, especially Bryan Wells, Raj Kumar Pan and C Subramanian (Subbu) with whom we began our computational exploration of the Indus Civilization inscriptions, as well as, Mayank, who has played the vital

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We are grateful to Andreas Fuls for maintaining the online database of Bryan's concordance that has been a vital resource for the community. We fondly acknowledge our interactions with the late Iravatham Mahadevan, whose infectious enthusiasm we miss greatly. The Indus Research Center at the Roja Muthiah Research Library, with G Sundar at its helm, has provided a wonderful meeting place for exchange of ideas. We would also like to thank Nandini Mitra, who has been instrumental in getting us interested in the decipherment of Brahmi by Prinsep, and Kurush Dalal for suggesting that we look at the non-linguistic system used by Mumbai Dabbawalas. We would also like to express our gratitude to the Department of Atomic Energy, Government of India, for their generous funding of the Computational Epigraphy Lab (iCEL) that has enabled us to continue work over the past several years.

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序言
鉴于对人类家庭所有成员的固有尊严及其平等的和不移的权利的承认,**乃是世界自由、正**义与和平的基础,

鉴于对人权的无视和侮蔑已发展为野蛮暴行,这些暴行玷污了人类的良心,**而一个人人享有言**论和信仰自由并免予恐**惧和**匮乏的世界的来临,**已被宣布**为普通人民的最高愿望,

鉴于为使人类不致迫不得已铤而走险对暴政和压迫进行反叛,**有必要使人**权受法治的保护,

鉴于有必要促进各国间友好关系的发展,

鉴于各联合国国家的人民已在联合国宪章中重申他们对基本人权、人格尊严和价值以及男女平等权利的信念,**并决心促成**较大自由中的社会进步和生活水平的改善,

鉴于各会员国业已誓愿同联合国合作以促进对人权和基本自由的普遍尊重和遵行,

鉴于对这些权利和自由的普遍了解对于这个誓愿的充分实现具有很大的重要性,

因此现在,**大会**,发布这一世界人权宣言,**作**为所有人民和所有国家努力实现的共同标准,**以期每一个人和社会机构**经常铭念本宣言,**努力通**过教诲和教育促进对权利和自由的尊重,**并通**过国家的和国际的渐进措施,**使**这些权利和自由在各**会**员国本身人民及在其管辖下领土的人民中得到普遍和有效的承认和遵行;

Preamble
Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world,
Whereas disregard and contempt for human rights have resulted in barbarous acts which have outraged the conscience of mankind, and the advent of a world in which human beings shall enjoy freedom of speech and belief and freedom from fear and want has been proclaimed as the highest aspiration of the common people,
Whereas it is essential, if man is not to be compelled to have recourse, as a last resort, to rebellion against tyranny and oppression, that human rights should be protected by the rule of law,
Whereas it is essential to promote the development of friendly relations between nations,
Whereas the peoples of the United Nations have in the Charter reaffirmed their faith in fundamental human rights, in the dignity and worth of the human person and in the equal rights of men and women and have determined to promote social progress and better standards of life in larger freedom,
Whereas Member States have pledged themselves to achieve, in co-operation with the United Nations, the promotion of universal respect for and observance of human rights and fundamental freedoms,
Whereas a common understanding of these rights and freedoms is of the greatest importance for the full realization of this pledge,
Now, therefore,
The General Assembly,
Proclaims this Universal Declaration of Human Rights as a common standard of achievement for all peoples and all nations, to the end that every individual and every organ of society, keeping this Declaration constantly in mind, shall strive by teaching and education to promote respect for these rights and freedoms and by progressive measures, national and international, to secure their universal and effective recognition and observance, both among the peoples of Member States themselves and among the peoples of territories under their jurisdiction.

Fig. 1: An example of a bilingual set of inscriptions from the modern era, viz., the preamble of the Universal Declaration of Human Rights proclaimed by the United Nations General Assembly in Paris on 10 December 1948. The English text on top has been retrieved from the website of the United Nations (www.un.org) on August 8, 2025, while its Chinese (Mandarin) translation at the bottom has been retrieved on the same day from the website of the United Nations Human Rights Office of the High Commissioner (www.ohchr.org).

Criminal’s (Abe Slaney staying at Elrige’s Farm) first message

Criminal’s second message

Criminal’s third message

Elsie’s response

Criminal’s final message

Sherlock Holmes message to the criminal

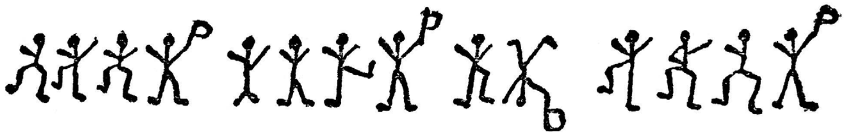

Fig. 2: The messages written using a substitution cipher in the Sherlock Holmes short story “The Adventure of the Dancing Men” (1903) by Arthur Conan Doyle. Holmes decrypts the message by guessing that the underlying language is English and then using knowledge of relative frequencies of letters in English texts, along with the intuition that some of the “words” spell out proper nouns corresponding to certain names of people and places associated with the events.

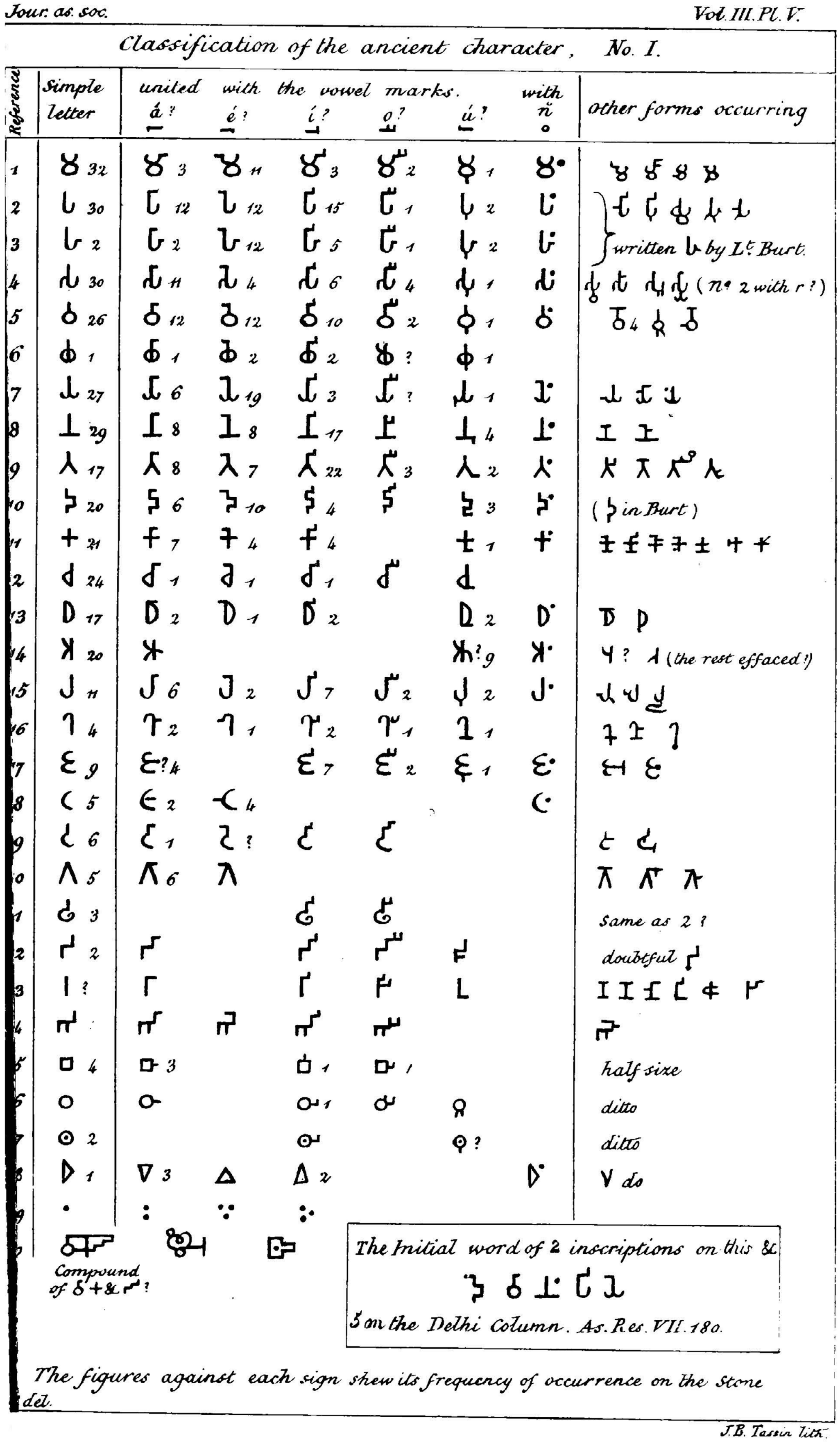

Fig. 3: Prinsep's frequency chart of graphemes occurring in the Allahabad Pillar inscription.

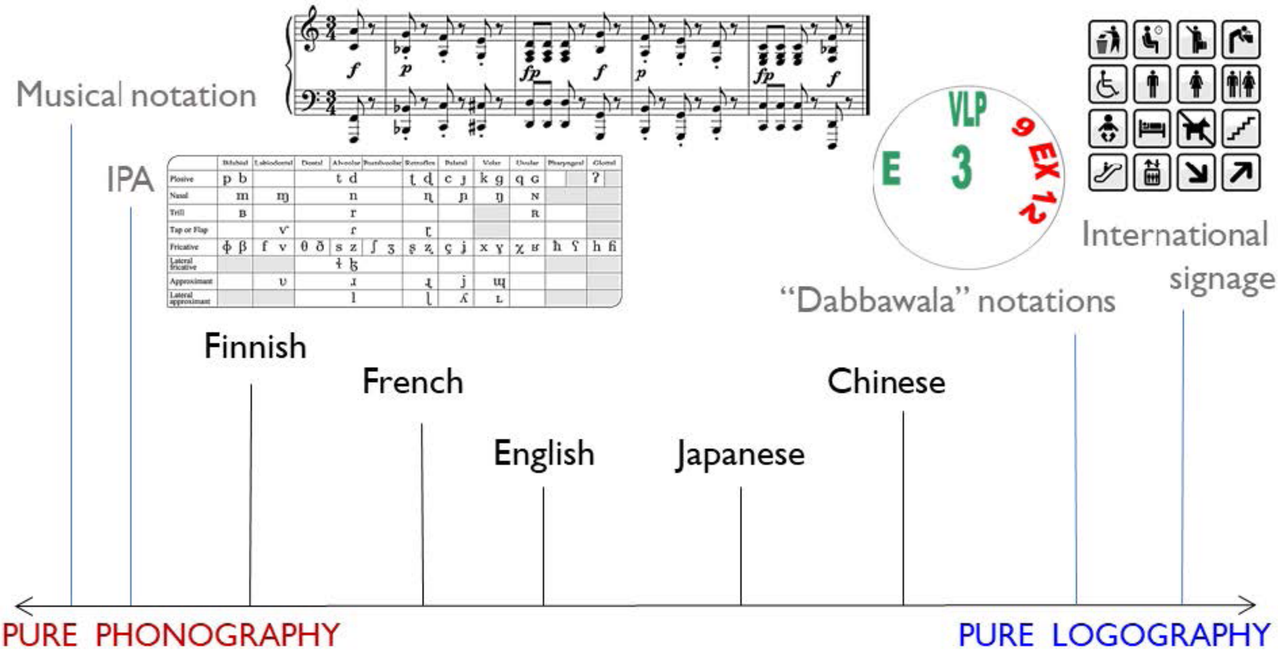

Fig. 4: All writing systems lie between the extremes of pure phonography (left) and pure logography (right) [figure modified from Robinson 2002]. Although Finnish, French and English all use pure alphabets, their differing rules of orthography makes it possible to reproduce the sounds of spoken Finnish relatively unambiguously from its written form compared to French, and even more so than English. Japanese is written using a mixed system that uses syllabic (kana) and alphabetic (romanji) elements in addition to logograms (Kanji characters that are borrowed from Chinese), and are thus more phonographic in nature compared to Chinese. Examples of specialized writing such as the International Phonetic Alphabet (IPA) and non-linguistic systems such as musical notation or international signage, are also shown. The case of the signage used by Dabbawalas (transporters of food from home to office – and back – in the city of Mumbai) can be considered to be writing used as a mnemonic device in that it uses letters and numerals (and also different colors) to indicate the end locations and way stations.

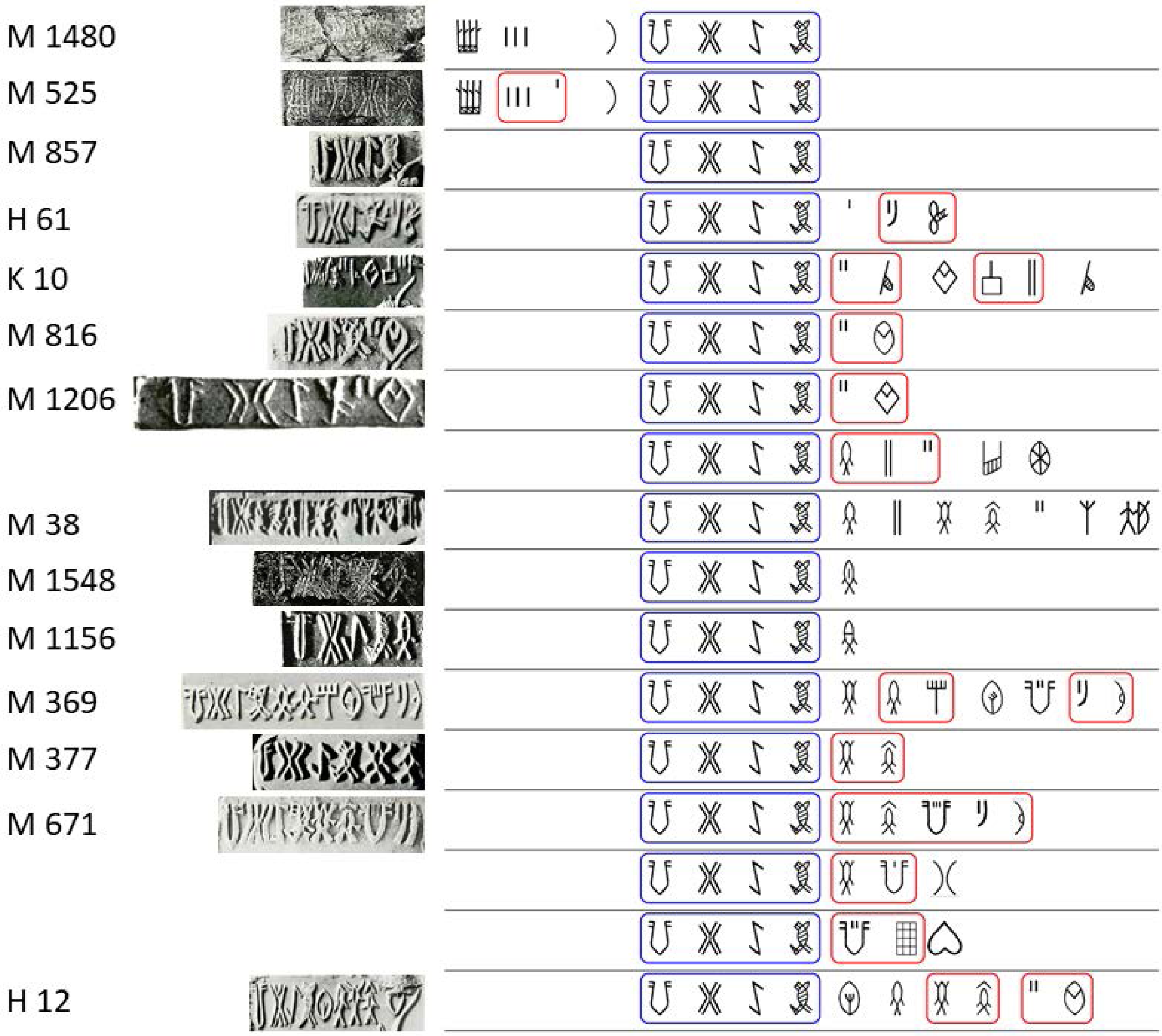

Fig. 5: A tabular arrangement for aligning sequences having in common a four-sign cluster of graphemes ("anchor sequence", shown enclosed in a blue cartouche) that co-occur more frequently than is possible by chance, and hence must be an unit conveying meaning. This is supported by the fact that the cluster can occur independently as a sequence (3rd row). The other graphemes in the sequences can also occur together much more often than randomly. Such statistically significant sign clusters are enclosed in the red cartouches. Note that two signs (viz., lozenge inside an oval in the 6th row, and lozenge inside a diamond in the 7th row) occur in identical positions relative to the anchor sequence. Moreover, their close resemblance to each other, suggests they are allographs, i.e., stylistic variants of the same grapheme. Sequence photographs (cropped from the corresponding seal images), identified by their CISI id numbers, are from Parpola 1987 and Shah 1991. The three inscriptions not having CISI id are from Wells 2015.

Indus Script's Gemstone and Precious Shiny Commodity Related Fish-Signs, and Indus Gemstone-Word "Maṇi": Ancestral Dravidian Symbolism in Indus Logograms and Language(s)?

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1. Introduction

Analyzing various archaeogenetic (Narasimhan et al., 2019; Pagani et al., 2017), archaeological, linguistic (Ansumali-Mukhopadhyay, 2021, Parpola, 1994; Parpola 2015), ethnographic (Parpola 1988; Krishnamurti; 2003, p.501), and toponymic (Balakrishnan, 2019) evidences, several scholars have argued that a significant population of the ancient Indus valley civilization (IVC) spoke ancestral-Dravidian languages. Many scholars have also tried to read Indus script (ISC), by applying the rebus principle, and treating Indus script signs as phonograms of certain ancient Dravidian languages (e.g., Heras, 1953; Parpola, 1994). Mahadevan (2014), who treated ISC's signs as logograms, often applied certain "Dravidian proofs" for connecting the iconicity of some ISC-signs with Dravidian linguistic words using homonymy, to "read" certain ISC inscriptions.

This study uses a novel approach for decoding the fish-like signs of the semasiographic Indus script, and for linking their symbolism to certain ancient symbolism found exclusively in linguistic symbolisms used in extant Dravidian languages. Fish-like signs (Fig.1a) are one of the most prominent groups of ISC signs, which occur in around 1250 inscription-lines among around 5500 inscription-lines recorded in ICIT (see Fig.1, b-c). The usage of the crocodile-fish symbolism found in certain artefacts (e.g., seal M410, Fig.1b), and the fish-shaped incised-tablets containing fish-sign inscriptions (H-329, Fig.1b), confirm that the fish-like sematograms/logograms employed some kind of fish symbolism to convey their meanings. However, like most aspects of ISC, the semantics of these fish-signs have been highly debated by scholars. For example, the most frequent fish-like ISC-sign is classified as a syllabic-sign by Wells (2015, p. 7), an attributive-lexeme by Mahadevan (1986, p. 21), and a metrological unit by Bonta (2010, pp. 22-30, 57-58).

Parpola (1994, pp.179-185, 279-283) suggests that might have encoded "mīn", a Dravidian homonym signifying "fish", "star", "to shine", etc., and might have formed certain theophoric-astral anthroponyms, along with its accompanying signs. According to Fairservis (1992, pp.11,48-58), the fish-like signs were semantically associated with a "knot or twist in a loom", not fish. Fairservis proposes that since certain Dravidian words are related to "twist"/"loop" (e.g., 'piri'), and are homonyms to words meaning "chief", the "fish-signs" were actually Dravidian chief-words ('pir', 'talpir', 'acci-pir', 'maru-pir', etc.). By considering Sanskrit as ISC's underlying language, and applying the principle of acrophony, Rao (1979, pp.183-186, 262-264), has claimed to decipher almost all ISC-signs, and has assigned phonological values 'ś', 'man', etc., to various fish-signs. Contrarily, Mahadevan (2011) has reinterpreted the fish-signs as representations of certain "water nymphs" or "priestesses" worshipped in IVC.

Building on the author's previous articles (Ansumali-Mukhopadhyay, 2019; Ansumali-Mukhopadhyay, 2021; Ansumali-Mukhopadhyay, 2023; Ansumali-Mukhopadhyay, 2024a; Ansumali-Mukhopadhyay, 2024b) this article argues that:

i. The fish-like logograms of ISC signified meanings associated with gemstones, precious beads, precious shiny commodities such as polished metallic artifacts, lapidary crafts, gemstone-bead trading, the barter equivalencies for such commodities, and related taxes and licenses.

ii. The fish symbolism used for such logograms is linked to an ancestral Dravidian symbolism related to glittering and polished things, which is still extant in linguistic symbolism found across several Dravidian languages.

iii. It also analyses the inscribed drain-pipes of Kalibangan, and claims that they were repurposed as a gemstone-bead container, as signified by the gemstone related fish-sign and bead-string related sign engraved on it.

iv. This article also suggests that the Persian word Mīnākārī for enameling, was derived from an Indus-Dravidian "mīn"-based word, and was associated with the glazed blue faience of IVC.

If these hypotheses are correct, they not only decode the overall semantics of a significant set of Indus-inscriptions that contain fish-signs, but also provide another important link between the Indus civilization, and the ancient Dravidian languages and ideology.

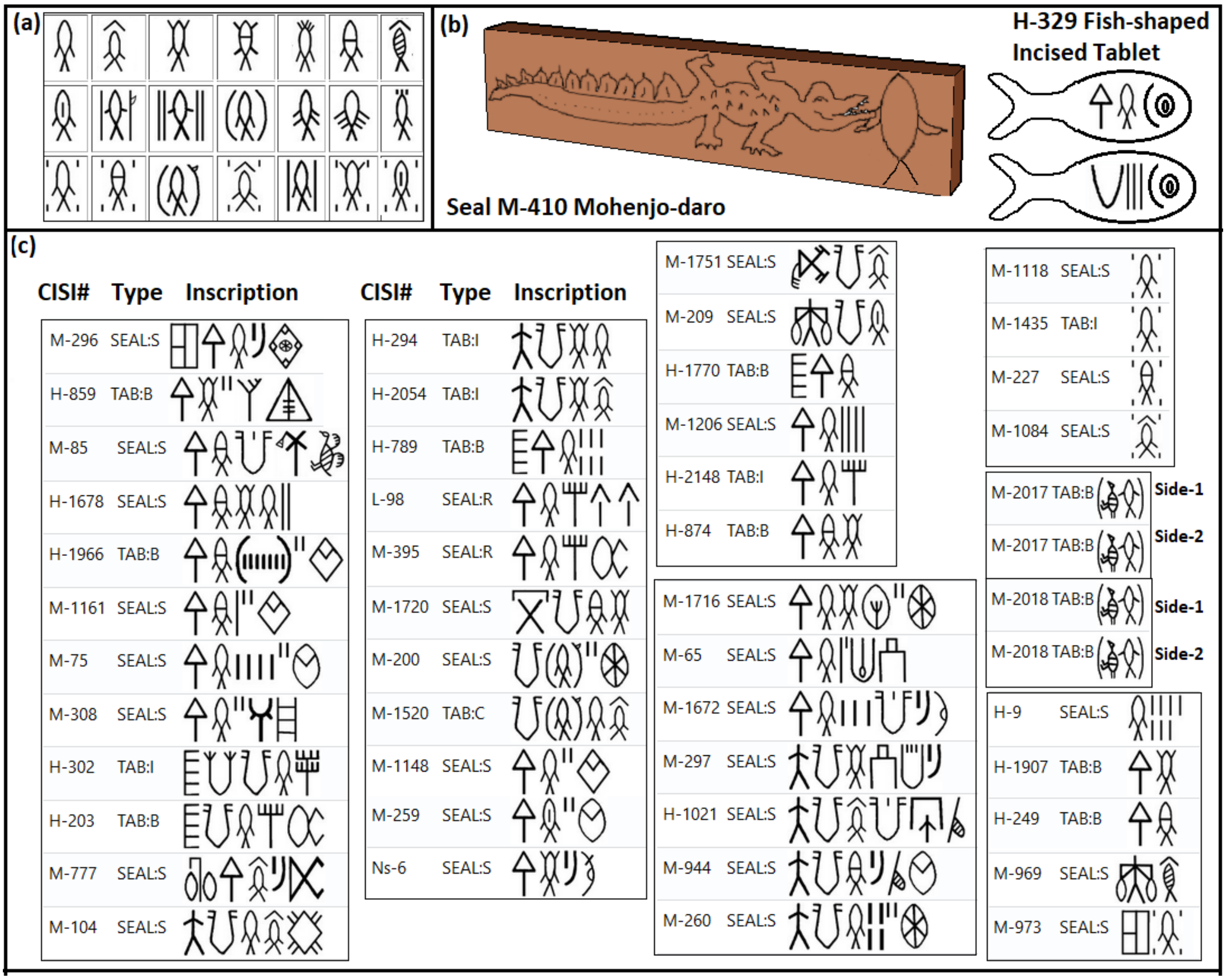

Fig. 1: Fish-like logograms and their usages in Indus script inscriptions

2. Materials and methods

2.1. Methods

This study builds on the author's recent articles, which claim that ISC is no more completely undeciphered. Ansumali-Mukhopadhyay (2019) has already proven how ISC was written using only sematograms (meaning-units) and/or logograms (word-units), and how signs belonging to different semantic classes usually occurred in different inscriptional segments (Fig.2). As argued in Ansumali-Mukhopadhyay, 2023; Ansumali-Mukhopadhyay, 2024a; and Ansumali-Mukhopadhyay, 2024b; the semantic scope of ISC-inscriptions comprised taxation, trade and craft licensing, commodity control and access control, and specific segments of the inscriptions encoded specific types of tax/license related information (Fig.2). Ansumali-Mukhopadhyay, 2024b specifically decodes the ISC signs for gold/precious-metals/goldsmithing , discusses its occurrences on certain goldsmith's tools found at Mohenjo-daro, and argues that the core-informational segments of ISC inscriptions, where this gold ( ) and precious-metals ( ) related signs/sign-sequences occur, encoded names of various taxed commodities and licensed trades and crafts (Fig.2). Building on these findings, this article decodes the fish-like Indus signs using the following types of evidence:

i. By analyzing the archaeological contexts of the inscriptions containing fish-signs in their core-informational segments, this study argues that such fish-sign inscriptions occur in significantly high frequency near jeweler's shops and lapidary workshops, indicating that fish-signs were related to the commodities made and sold in such places.

ii. By analyzing the ISC corpora, this study proves that the fish-like signs very often occur accompanying the gold and precious metal signs in the core-informational segments of ISC inscriptions. This indicates that the fish-signs signified certain precious commodities and crafts (e.g., gemstones, lapidary crafts, bead-trading, shiny metallic artifacts, etc.) related to gold and goldsmithing, as related crafts/commodities will logically co-occur in the core-informational segments of the tax/license related ISC inscriptions.

iii. The polysemic Proto-Dravidian fish-word "mīn", a popular fish-word used across several Dravidian and non-Dravidian languages of present India, also signifies 'shining', 'bright', and 'gemstone' in Dravidian languages. Since verbs derived from the Proto-Dravidian root-verb "*mīn" signify "to shine," "to glitter," "to polish", etc., shining natural things, such as stars, fireflies, glow-worms, lightning, etc., and polished glittering things such as gems and coins, are often signified with words derived from the "*min" root in several Dravidian languages. This linguistic symbolism, and fish-based homonymy for gemstones, metallic coins, and other glittering things, are not found in any other language-group of the Indian subcontinent. Since ancestral Dravidian languages and culture was prevalent in Indus settlements (Ansumali-Mukhopadhyay, 2021; Balakrishnan, 2019; Parpola, 1994; Parpola, 2015), the Indus scribes possibly applied the ancient Dravidian fish-based homonymy to encode gemstones, lapidary crafts, and other shiny, polished precious commodities and their related trades/crafts by the fish-like logograms.

iv. Analyzing trade related documents of ancient Near East, this study discusses that the apotropaic beads made of precious stones, which were sold by ancient Indus traders to the traders of ancient Near East, were called "fish-eye beads", and argues that the ancient Indic word for beads and gemstones, i.e., "maṇi", travelled from Indus settlements to Mesopotamia, and remained fossilized in their documents. This paper further argues that the ancient word "maṇi" is a word of Dravidian origin, links its meaning to the apotropaic eye-patterned gemstone beads of *Meluhha*.

v. As discussed by Ansumali-Mukhopadhyay (2019; 2021), all decipherment efforts that treat ISC-signs as phonograms must be wrong, as ISC was written using sematograms and logograms. Thus, even when such attempts claim to have discovered Dravidian words "spelled" in Indus inscriptions, they are wrong due to their flawed methodologies. Indus inscriptions might have been influenced by contemporary linguistic symbolisms and homonymy. Thus, the iconicity used in some of the logograms can be possibly traced to ancient Dravidian symbolism. But Indus signs were not phonograms used to spell words. Thus, while this article seeks to explore the symbolisms used in certain Indus signs, and seeks to link some of them to ancestral Dravidian symbolisms, it does not support the studies that try to discover Dravidian language words "spelled" in Indus inscriptions.

2.2. Materials

The materials used here include three ISC corpora created by different scholars (Wells and Fuls, 2006; Mahadevan, 1977; Joshi and Parpola, 1987; Shah and Parpola, 1991; Parpola et al., 2010; Parpola et al., 2019). All inscribed artefacts are referred to using their CISI serial-numbers, unless mentioned otherwise. When CISI-numbers are absent, the excavation numbers of those artefacts, prefixed with ASI# (Archaeological Survey of India), are used.

Since most of the inscriptions were supposed to be read from right-to-left (Mahadevan, 1986), even if certain inscriptions were written from left-to-right, top-to-bottom, and radial directions, all the Indus-inscriptions are rendered in a right-to-left normalized direction, when not mentioned otherwise. Other than ISC-corpora, various archaeological excavation reports, ancient texts, and books on history and linguistics have been used in this study.

3. Archaeological evidences for decoding the fish-like ISC signs

Contextualizing ancient artefacts can be very tricky, as while doing it, the researcher needs to keep in mind the following: i) whether the actual deposition contexts were primary or secondary; ii) whether the artefacts were dislocated by natural processes such as complex cycles of surface decay caused by saline weathering, rain wash-out (Vidale, 2000), earthquake, flood, etc., or by human interventions, such as building, rebuilding, moving of soil from one place to another, robbery, etc.

Moreover, cities like Mohenjo-Daro were not like flat parking lots that grew up in perfectly horizontal layers. Thus, even the contemporary buildings of such ancient cities might have been laid at different levels, and artifacts found at different depths in different buildings might have been contemporary to each other. The opposite is also true.

To avoid errors caused by the above mentioned complexities, this study contextualizes Indus artifacts only when several artifacts related to the same trade/craft are found in high concentration in a very small area. In such cases, it would be statistically quite improbable that several mutually related, and almost undamaged artifacts (e.g., various materials for making ornaments) landed up in the same place from different strata. As discussed below, such contextualization of artifacts and inscriptions can immensely help to understand the semantic scopes of certain Indus inscriptions.

3.1. Fish-sign inscription found in a Jeweller's shop at Mohenjo-daro

Marshall (1931, Vol-1 pp.194-195) describes a small 8-by-7 feet room found in House-VIII of the HR Area of Mohenjo-daro, which "yielded the most important find of the season". The artefacts found in this room were: (i) silver and copper vases (ii) a copper axe and chisel (iii) various gold and silver ear-ornaments (iv) bangles, (v) diadems, (vi) fillets, (vii) pins, (viii) unfinished ornaments, (ix) "a large collection of beads of gold, silver, faience, semi-precious stones, mounted in some cases in gold caps at both ends", (x) pendants made of different materials, (xi) perforated spacers, (xii) hemispherical ornament terminals, etc.

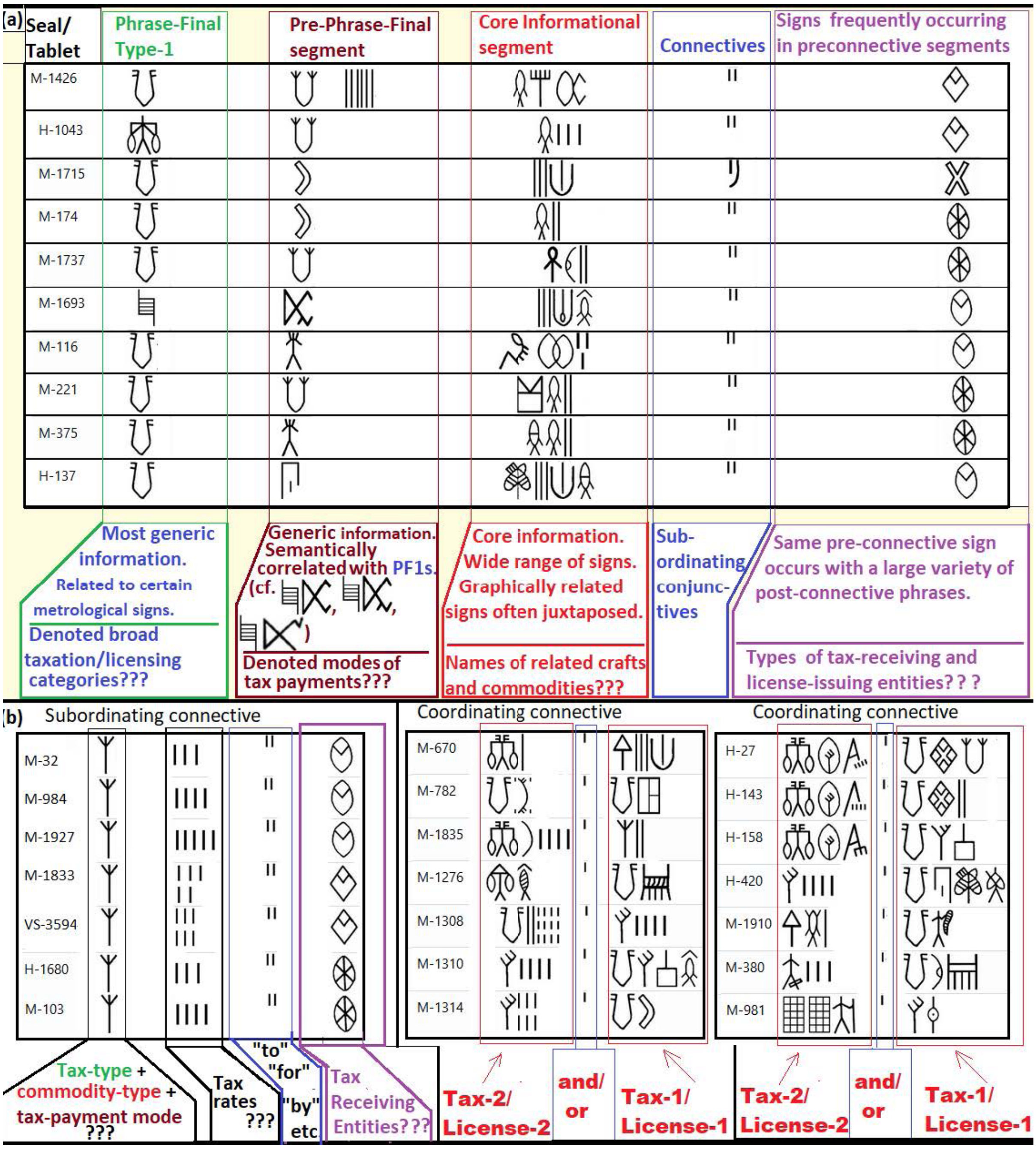

Fig. 2: Inferred semantic scopes of different inscriptional segments explained by selected Indus script inscriptions

This room was undoubtedly a part of a jeweller's shop as: (a) It is simply not possible that so many items linked to jewellery had been dislocated from different stratigraphic layers to get accidentally assembled inside this 8-by-7 feet small enclosure; (b) Since a chart scraper, several unfinished ornaments, and parts of ornaments (spacers, terminals, etc.) are also found in this room, it must have been a place of making and selling jewellery, not a personal treasury of a wealthy person. Interestingly, this jeweller's shop has yielded a single seal, CISI#M-294, containing the inscription , and an interesting iconography with two animals, a syncretic bovine-animal with a trunk, and an elephant (Fig.3a). Though this seal is clipped on right side (see CISI-1, p.71), analysing the position of its text and the accompanying iconography,

the existence of the phrase-ending PF1-sign , the space remaining after , and the spacing pattern in similar inscribed seals/tablets (Fig.3 b-c), we can be sure that this inscription-line was the undamaged complete message of this seal, which is not affected by clipping (Fig.3a). Moreover, similar patterns of <Stroke-sign Fish-sign PF1-sign> are found in several other Indus seals and tablets (Fig.3 b-c), reinforcing the completeness of the inscription of seal CISI#M-294.

Now, Indus seals were mostly used as tax-stamps and commercial permits (Ansumali-Mukhopadhyay, 2023), and the signs occurring in the core-informational segments of Indus inscriptions were most possibly names of taxed commodities and licensed trades/crafts (Ansumali-Mukhopadhyay, 2024a). Thus, the core-informational segments of ISC inscriptions should be more context-sensitive. For example, the same tax-types (such as customs tax, or sales tax) will be applicable to multiple types of commodities and crafts, and the archaeological contexts of the seals or tablets might not help to decode signs related to tax-types or tax-collecting entity types. But seals related to specific taxed commodities or licensed crafts, will logically contain names of those crafts/commodities, and such seals are expected to be found in higher frequencies near related craft-workshops or shops. Thus, when we get a single seal in an undoubtable archaeological context of a jeweller's shop, we should semantically link its inscription's core-informational context-sensitive part (i.e. , III , with commodities related to jeweller's craft and associated taxation and trade-license.

Now, in the sign-sequence III, the numeral III possibly signifies the commodity-specific tax-rate or licensing-fee (Ansumali-Mukhopadhyay, 2023; Ansumali-Mukhopadhyay, 2024a). Hence, the remaining fish-sign of the context-sensitive core-informational part should be associated with the archaeological context of this seal, i.e., the context of a jeweller's shop. So,

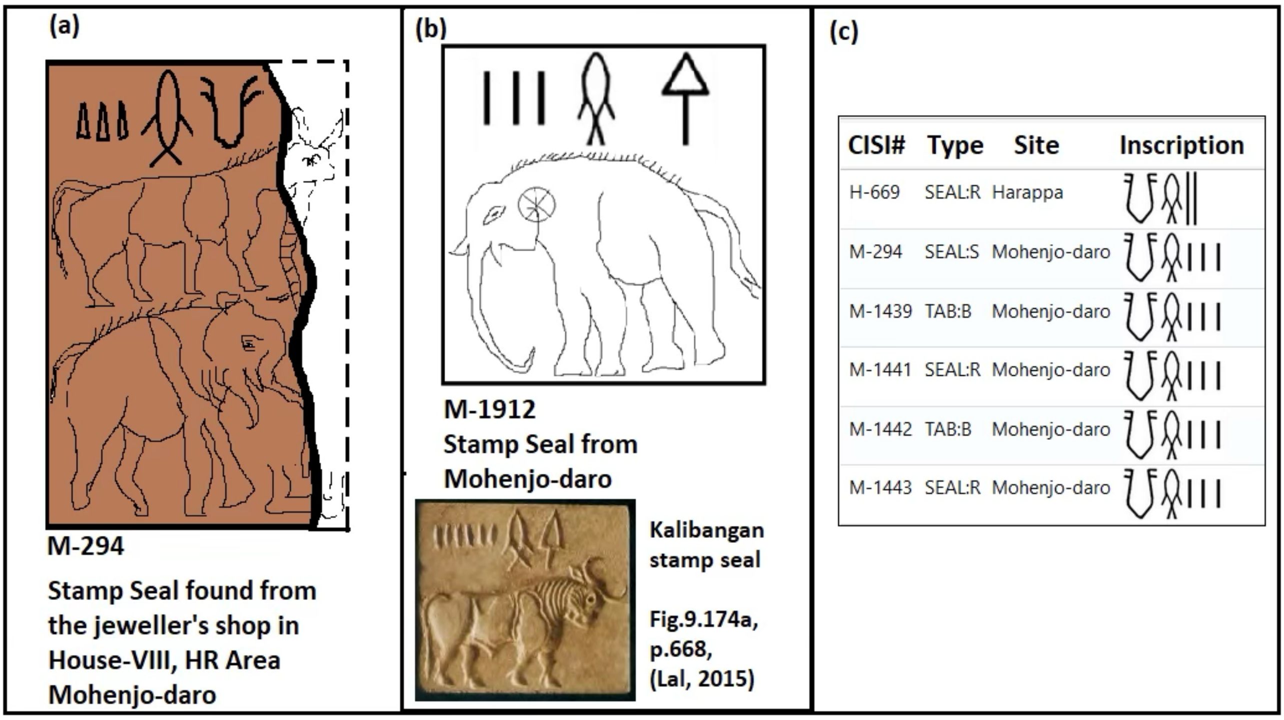

Fig. 3: Representative Drawings of Seals M-294 (a), M-1912 (b), and some related inscriptions (c)

possibly signified meanings related to gemstones, jewellery-making, etc. The PF1-sign of possibly signified a common tax/license-type (Ansumali-Mukhopadhyay, 2023) that was also applicable in this context.

It is possible that the jeweller of this shop had to pay certain periodic fees to keep this seal issued to him by the authorities signified by the iconography of the seals, and that he had to stamp his packages with this seal to establish their licensed/tax-paid status. Otherwise, the seal might have been mainly used as the jewellery shop-keeper's license.

3.2. Fish-sign inscriptions concentrated in lapidary related context at Harappa

In Harappa, Vats (1940, pp. 58-60, 435) reports the finding of "a number of instructive antiquities, including a representative collection of jewellery" (Series No. 8650), which comprised

i. numerous objects of stone, faience, gold, and copper;

ii. two small cubical weights weighing 26.3 and 4.3 grams, which are suitable for measuring precious metals, gemstones, etc.;

iii. shells;

iv. a large collection of beads (of various shapes and sizes, made of gold, carnelian, steatite, faience, shells, etc.); and

v. several seals and incised tablets.

All these artefacts were discovered in squares H-12/21 and I-12/1 of Mound-F Stratum-IV, where "a well and fourteen Workmen's Quarters of peculiar design" were also found. Here, the presence of a large collection of gemstone beads, small weights, and workmen's quarters indicate that this place was an important lapidary workshop, and/or a place for hoarding and dispatching gemstone beads and other such precious commodities. Now, the tablets and seals found from the 8650-series contain 6 distinct inscriptions (counting tablets with same inscriptions only once), among which 4 inscriptions contain fish-signs (see Fig.4). Among the other seals/tablets found nearby, 3 more tablets contain fish-signs. Since Indus tablets were trade/craft licenses (Ansumali-Mukhopadhyay, 2023; Ansumali-Mukhopadhyay, 2024a), the existence of multiple tablets with identical inscriptions found here indicates that multiple tablets with permits for trades/crafts associated to the workshop were possibly being crafted here to be given/sold to related traders or artisans. The high concentration of fish-sign inscriptions with a lot of lapidary and jewellery related items indicates a strong correlation between fish-signs and lapidary and jewellery related trades/crafts.

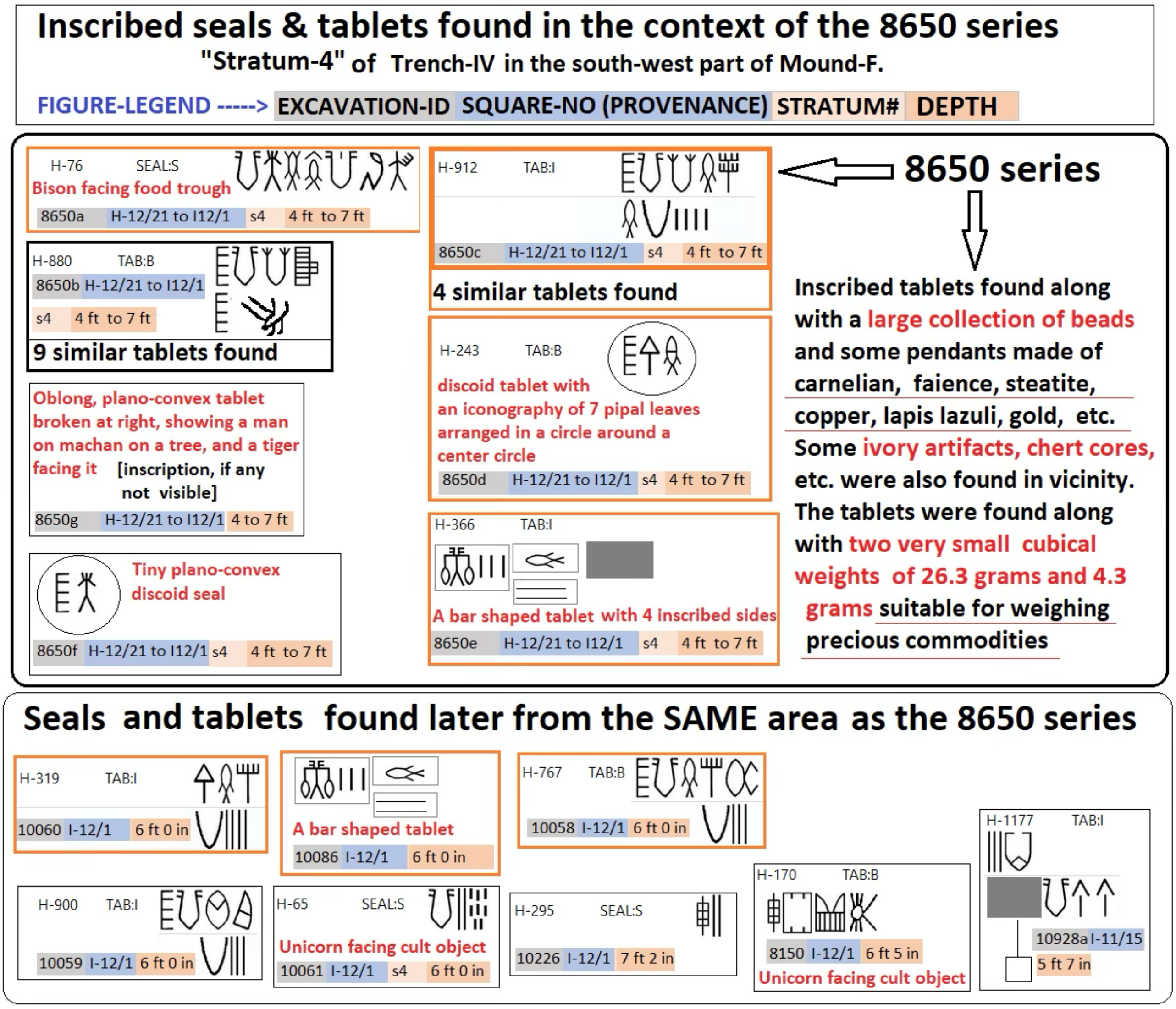

Fig. 4: Contextualized diagrams of inscriptions of seals and tablets found from a lapidary workshop of Harappa. Objects with fish-sign inscriptions are marked with orange borders

3.3. Fish-sign inscriptions concentrated in lapidary related contexts at Chanhu-daro

During the Harappa-II occupation (middle of third millennium BC), the IVC settlement at Chanhu-daro was thriving with various commercial activities, among which "bead-making was an important source of revenue", as "large numbers of unfinished beads, together with the stone drills used for boring them", and "supplies of the raw materials for bead-making", such as lumps of amethyst, crystal, carnelian, and nodules of agate often treated with heat, are abundantly found here (Mackay, 1943 p.52). The Plate-IV in Mackay's (1943) excavation report contains a detailed contour map of Chanhudaro's Mound-II of Harappa-II occupation, where the excavated area is divided into 50-feet squares labelled with row and column numbers. Using this map, and the detailed provenance of the reported artefacts, I have made a contextualized diagram of the inscribed seals/tablets found in this area (see Fig.5). Now even though traces

of lapidary activities along with other craft-activities have been found in multiple excavated Squares, Mackay has specifically identified a building of Square-9/D (comprising locations numbered 215, 286, and 287) as a "bead factory with furnace", where copper-tools, copper and bronze knives, shell and faience objects, a flake drill, some carnelian nodules, and various unfinished beads that were meant to be glazed, were found in the same level (+10.4 feet).

Moreover, 14 small-range weights suitable for weighing precious metals and gemstones, and small scale-pans of copper suitable for the same, were also discovered here. An additional small weight was found in a nearby furnace-room. Square-9/D is specifically identified as bead-maker's area, as it yielded not only unfinished beads, but various rare bead-making tools, and a system of flues possibly used for glazing beads (Mackay, 1943 pp.41-44,187). Now, we can see in Fig.5 that out of the nine inscribed seals found from Square-9/D, six seals have fish-signs in them. Moreover, among all the Squares of Mound-II, the Square-9D, which contained the bead-factory, has yielded the maximum number of inscriptions containing fish-signs, which should not be a mere coincidence.

According to Vidale (2000, p.121), the buildings of Chanhu-daro, "might have been warehouses of rich merchants, more than workshops and actual residences of craftspeople, while the

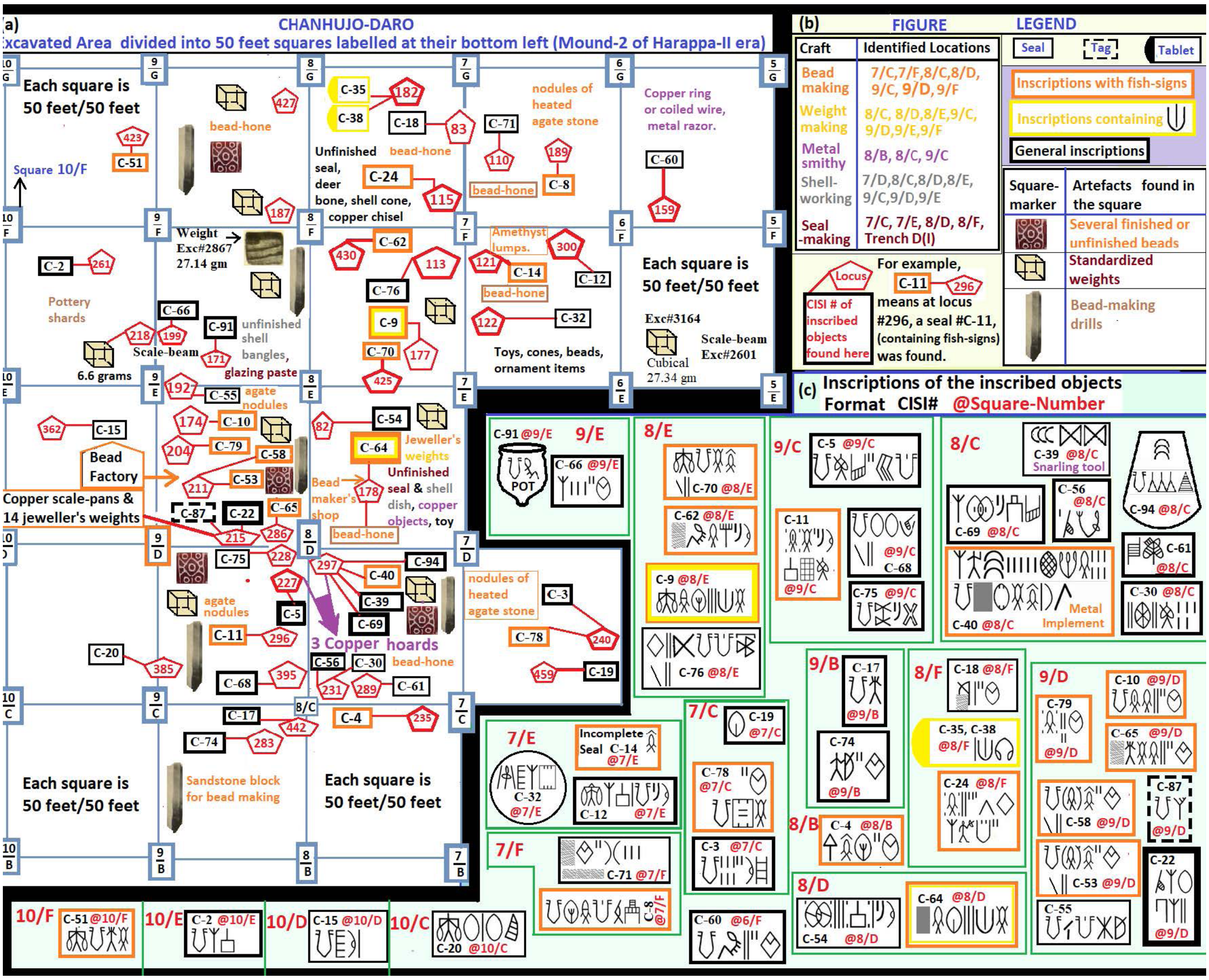

Fig. 5: Some contextualized inscriptions found from Mound-II, Second Harappan Occupation at Chanhu-daro.

working areas, as suggested by Mackay, might have been sheltered outside the buildings, under provisional roofings.

Some important activities such as storage, hoarding and perhaps accounting, and some critical manufacturing steps, for example, the firing of good quality, valuable carnelian nodules, could be carried on in the buildings (the kiln in room 215-286), under direct control of merchants and craft supervisors". Now, irrespective of whether Square9/D was a bead-factory (Mackay, 1943), or a place for hoarding, accounting, selective processing, and dispatching of gemstones and beads (Vidale, 2000), it was certainly related to gemstone-beads. Thus, the unusually high presence of fish-inscriptions in the Square-9/D seals, strongly supports my hypotheses that Indus fish-signs were related gemstones and other similar shiny precious commodities.

3.4. Fish-sign inscriptions from Indus sites with less detailed excavation reports

Excavation reports written without sufficient details often rob us off the opportunities of correlating Indus-inscriptions with their specific contexts. For example, In the draft report of the Rakhigarhi excavations (the final reports for seasons 1997-98 and 1999-2000 are not available yet), Nath (2014, p.116 -118) mentions a fragmented mature Harappan era seal (ASI#6304) containing the fish-sign inscription , which was found from Rakhigarhi's RGR-2 area which has also yielded a large number of beads. Among the 11421 beads found from the reported Rakhigarhi excavation, more than 8000 beads come from areas RGR-2 and RGR-4 (Nath, 2014, p. 260). But Nath (2014) provided no detailed locational information for the RGR-2 area's beads or seals, making their contextualization impossible. Similarly, in the "bead factory" found in RGR-1, where a room-floor measuring 2.3mx2.3m contained around 2000 beads in various stages of manufacturing, two sealings with elephant iconography were also found. But Nath (2014, p.117), gave no detailed description of those sealings, and their inscriptions (if any), even though he mentioned that the sealings should have been related to the precious stone trade.

Interestingly, inscriptions similar to this RGR-2 seal are found from other Indus settlements with more contextual data, which can be correlated to lapidary related contexts. For example, in Chanhu-daro , (Seal C-67) was found in Square-13/J of Mound-I, where lapidary-related small agate weights (e.g., 27.36 gm, ASI#3822; ASI#3882), rare round-sectioned chisels for making depression in beads (see Bisht, 2015 p.446), copper axe, shell inlays, antler of a hog deer (deer antlers are still used for making beads), etc., are found (Mackay, 1943). Similarly, another Chanhu-daro seal (CISI#C-4, ASI#CH-2390) is found from square 8/B, very near to Square 8/C, where lapidary work and metal-smithy were in vogue and certain lapidary related weights were also discovered (Mackay, 1943). Interestingly, round-sectioned bead-drills are quite rare, and the only two such drills reported from Chanhu-daro are discovered from squares 13/J and 8/B, precisely the locations of the fish-sign inscriptions and . In Harappa, seal-inscription (ASI#10835a) is found at 3 ft. depth in Mound-F's Stratum-II, Square P-9/5 (400 square-feet area), along with various faience and steatite beads (Vats, 1940 pp.9,124,130 & Plate XXVI).

The insufficiently detailed excavation reports from Banawali provide another example of lost opportunities of correlating seal inscriptions with archaeological contexts. For example, in the brief articles on Banawali, Bisht (1984, p.96; 1982, p.117) has mentioned a seal (CISI#B-17, ASI#BNL-9201) containing fish-sign inscription , which was found from a "prominent" merchant's house, which also yielded "a rich harvest of seals, weights, beads, including those of gold, lapis and etched carnelian, besides the deluxe pottery of the age". However, this article provides no details about the other seals recovered from this house and its neighborhood. Thus, the other fish-sign inscriptions (, , ,) found from Banawali remain mostly contextless. Similarly, ICIT has recorded around 24 fish-sign-inscriptions from Kalibangan. But the Kalibangan excavation reports (Lal et al., 2015; Lal et al., 2020) contain almost no details regarding the exact find-spots of inscribed objects, beads, weights, and other artifacts, making any contextualization almost impossible.

3.5. Fish-sign-inscriptions share archaeological context with jeweller's weights

As shown in Fig.5, in Chanhujo-daro, inscriptions containing fish-signs were strongly correlated with the findspots of tiny weights suitable for weighing precious metals and gemstones (e.g., at squares 9/C, 8/D, 8/E, and at 9/D, along with 14 tiny jeweller's weights are found). Similarly, two small cubical weights weighing 26.3 and 4.3 grams were found along with a large collection of beads, a lot of jewellery related items, and many seals and incised tablets containing fish-sign inscriptions in Harappa (Fig.4).

However, unlike the seals/tablets found near workshops, the seals/tablets found together in residential buildings and 'khans' (ancient inns) have to be contextualized in a different way. For example, in Harappa, other than a few public houses, and some workmen's quarters, most of the buildings excavated by Vats (1940, p.14) are "dwelling-houses". Often, the seals/tablets found in such houses will have no specific craft/trade related contexts, as their dwellers might have controlled craft-workshops that were located far away from their residences or inns. For example, Vidale (2000) has observed that at Mohenjo-Daro, there is "positive evidence that at least some craft industries were performed outside the boundaries of the possible ceremonial-residential areas of the Citadel and the Lower Town".

However, when inscribed seals/tablets are found together with certain characteristic commodities in such a building, we might try to contextualize those inscriptions. For example, since traders dealing with gemstones, and tax-collectors controlling gemstone trading and lapidary crafts were supposed to carry small range weights suitable for measuring precious metals and gemstones while doing barter or tax-collection, they might have carried their seals/tablets containing fish-signs, gold-signs, etc., along with their small range weights, even at their dwelling places.

Thus, fish-sign inscriptions might sometimes be found along with small-range weights in residential houses and khans. For example, at Harappa, in SquareP-10/15 of Harappa's Mound-F, tablet H-747 (ASI#11516) containing a fish-sign-inscription ( ) is found with a cubical chert weight of 6.9 gram, at depth of 4 feet 8 inches below-surface (Vats, 1940, p.133-135).

Similarly, in Square M11/15, at the depth of around 5' to 5'9" inches below surface, 5 complete seals containing fish-sign inscriptions (, , , ,) and a fragmentary seal with a crucible-blowpipe based gold-sign (CISI#H-97), were found together, along with 9 cubical jeweller's weights (size ranging between 0.5" cube and 1 X 95" x 6" inches), 4 conch shells, a dozen terracotta beads, some pottery bangles and vases, shell beads, etc. (Vats, 1940, pp.85,416). These seals most likely belonged to a trader dealing with gemstones, jewellery and other precious commodities, whose licenses were possibly expressed through the fish-signs and the gold-sign.

In ancient civilizations, "temples" were often used as administrative centres for tax-collection (Stevens, 2006). Thus, the presence of certain small range weights and seals of in House-I of Mohenjo-daro's HR-A area indicates that this public building was not only a religious centre as interpreted by Jansen (1985), but also an administrative hub, which possibly used such weights for collecting taxes and tributes in modes of precious commodities such as precious metals, gemstones, etc. Interestingly, among the seven "unicorn" seals found at House-I (Jansen, 1985), four of the seals contain the gold-sign and/or fish-signs (ASI#HR-164, ASI#HR-629, ASI#HR-167, and ASI#HR-99), whereas two other inscriptions (ASI#HR-1575, ASI#HR-2582) contain signs and , which frequently co-occur with fish-signs and/or gold-signs in more than 100 inscriptions recorded in ICIT (e.g. and). Thus, it might not be a coincidence that a public administrative building of IVC, which yielded standardized-weights for measuring precious metals or gemstones, also yielded stamp-seals with gold-sign, fish-signs, and other signs that are highly correlated with these signs.

4. Script-internal and iconographic evidence of fish-signs signifying meanings related to gemstones, beads, similar precious commodities, and lapidary crafts

4.1. Fish-signs' co-occurrences with precious-metal related signs

Depending on which ISC-signs frequently co-occur with which other ISC-signs in different inscriptional segments, we can analyse the semantic relationship between them. For example, signs co-occurring in the core-informational segments of same inscriptions are arguably names of crafts/trades/commodities subjected to the same taxes or licenses (see modern examples of this theory in Fig.6a). Similarly, if the craft/commodity based ISC-signs occur in different sides of the same incised or bas-relief tablets, then those signs arguably signified related crafts or commodities, for which licenses or permits were assigned to the same tablet owner. We have already seen how inscriptions containing fish-signs are often found near the archaeological contexts of lapidaries, and in the context of gold/gemstone measuring small-range Indus weights. Interestingly, in the inscriptional space, the fish-signs very frequently co-occur with the gold/precious-metal based signs (,) in various types of correlated inscriptional contexts. For example, fish-signs and precious-metal signs often co-occur in the core-informational segments of seal/tablet inscriptions (Fig.6b).

4.2. Fish-sign inscriptions' co-occurrences with bead-string or beaded-stick symbol

Since ISC signs carefully retained their pictographic character for centuries, their meanings must have been directly or indirectly (metonymy, homonymy) associated with their graphical referents. While in many cases it is difficult to recognize those referents with our modern eyes, in certain cases the objects depicted by the signs' graphemes seem to be quite recognizable. For example, in case of signs and , the graphical referents of those signs seem to be strings of beads, hanks, or beads strung on sticks (Fig.7D). Stringing beads has been a standard way to keep beads organized, which is used even today (Fig.7D). Especially sign shows three bead-like oval/spherical objects with a vertical stroke going through them, closely resembling bead-strings (Fig.7D). Since gemstones like carnelian were translucent, if they are stringed around a thread or a stick, the stick or thread would be visible, explaining why the sign depicts the vertical line through the oval structures.

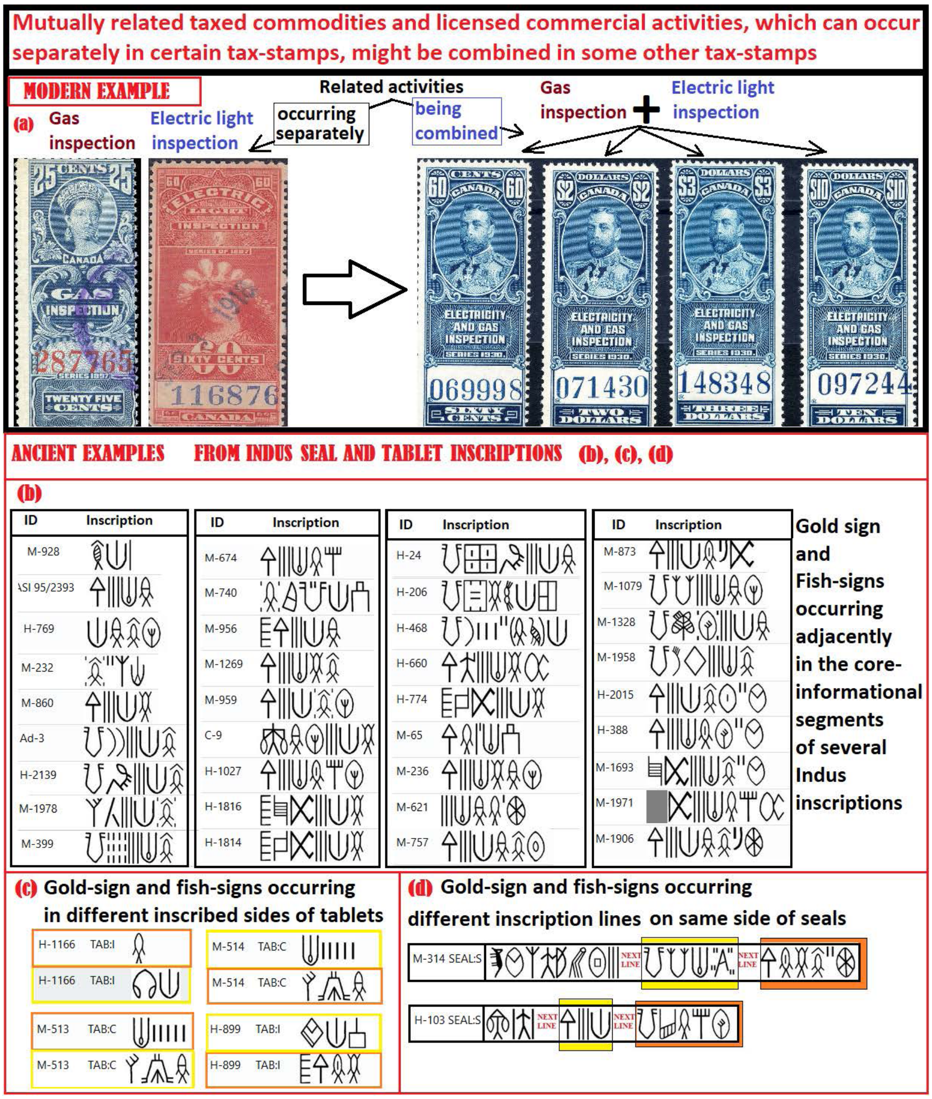

Fig. 6: Modern (a) and ancient (b) examples of related craft/commodity names being consolidated in tax-stamps. Fish-signs and Gold-sign of Indus script co-occurring in different inscriptional contexts

Among the inscriptions found so far, these signs are less frequent, as they occur in only 13 seals recorded in ICIT (Fig.7A). Among them, only 9 inscriptions have more than 2 signs. In seals with only 2-signs, these signs occur with the tax/license category related generic Phrase-final signs (e.g. , ,). So, in only 9 inscriptions, these bead-string like signs get the opportunity to occur with other signs specific to crafts or commodities. Among these 9 inscriptions, in 4 inscriptions either the gold-sign or the fish-signs occur (M-46, M-636, M-1765, Krs-1). Thus, the bead-string like signs seem to have semantic affinity with signs signifying precious-metals, gemstones, etc. Since beads are strongly semantically related to gemstones and precious metals, this inscriptional pattern and the graphemic features of signs and suggest that these signs could indeed be representations of beads, lapidary crafts, and bead trading. When more seals/ tablets with such signs engraved on them will be excavated, we will be able to reanalyse this tentative decoding of signs and .

4.3. Fish-sign inscriptions' co-occurrence with rare seal iconography of beaded necklace

It is true that the iconographies of Indus seals/tablets are generally not directly correlated with their inscriptions. As discussed in Ansumali-Mukhopadhyay (2023), seal iconographies were mostly emblems of the issuing-organizations of those seals. Since the same merchant or trade guilds, or the same settlement-based authorities could be involved in performing and controlling crafts/trades for different commodity types, the same iconography could be used for different types of mercantile inscriptions. However, inscribed Indus seals mostly use zoomorphic and anthropomorphic iconographies, accompanied by mangers, cult-symbols, etc. Sometimes the iconographies display certain religious or ritualistic narratives. But the seals rarely depict artifact-centric iconographies. Interestingly, seal L-51 of Lothal, has a rare artifact-centric iconography accompanied by a fish-sign-based inscription (Fig.7C).

In CISI volume-1 (p.249), Parpola et al. have described the iconography of L-51 as an "unidentified object". In the Lothal excavation report, S. R. Rao (vol.2 1985 pp. 310, 317) has described the "unique" iconography of L-51 as an object resembling a "seed drill". However, as shown in Fig.7C, this iconography is unmistakably a depiction of a beautiful choker-style multi-layered bead necklace, features of which can be compared to a necklace found from Mohenjo-daro, and various similar necklaces used in modern times. Perhaps it takes a woman's eye to recognize the design of an ancient beautiful necklace? Jokes apart, this is an extraordinary scenario, where a necklace is chosen as the emblem of an ancient organization. Now, which kind of guild will choose a necklace as its emblem? Most possibly a guild of jewellers, and/or gemstone traders, and/or lapidary-based artisans would want to identify itself with an image of a beautiful necklace, to advertise about their products and craftsmanship. Thus, since this seal's inscription contains two fish-like signs in the commodity/craft-related core-informational segment ( ), our hypothesis, that fish-signs were related to gemstones, lapidaries, and shiny precious commodities, get a significant amount of corroboration.

Interestingly, whenever the pre-phrase-final sign and phrase-final-sign combination occurs in a seal, in more than 80% cases either the precious-metal sign or the fish-signs occur

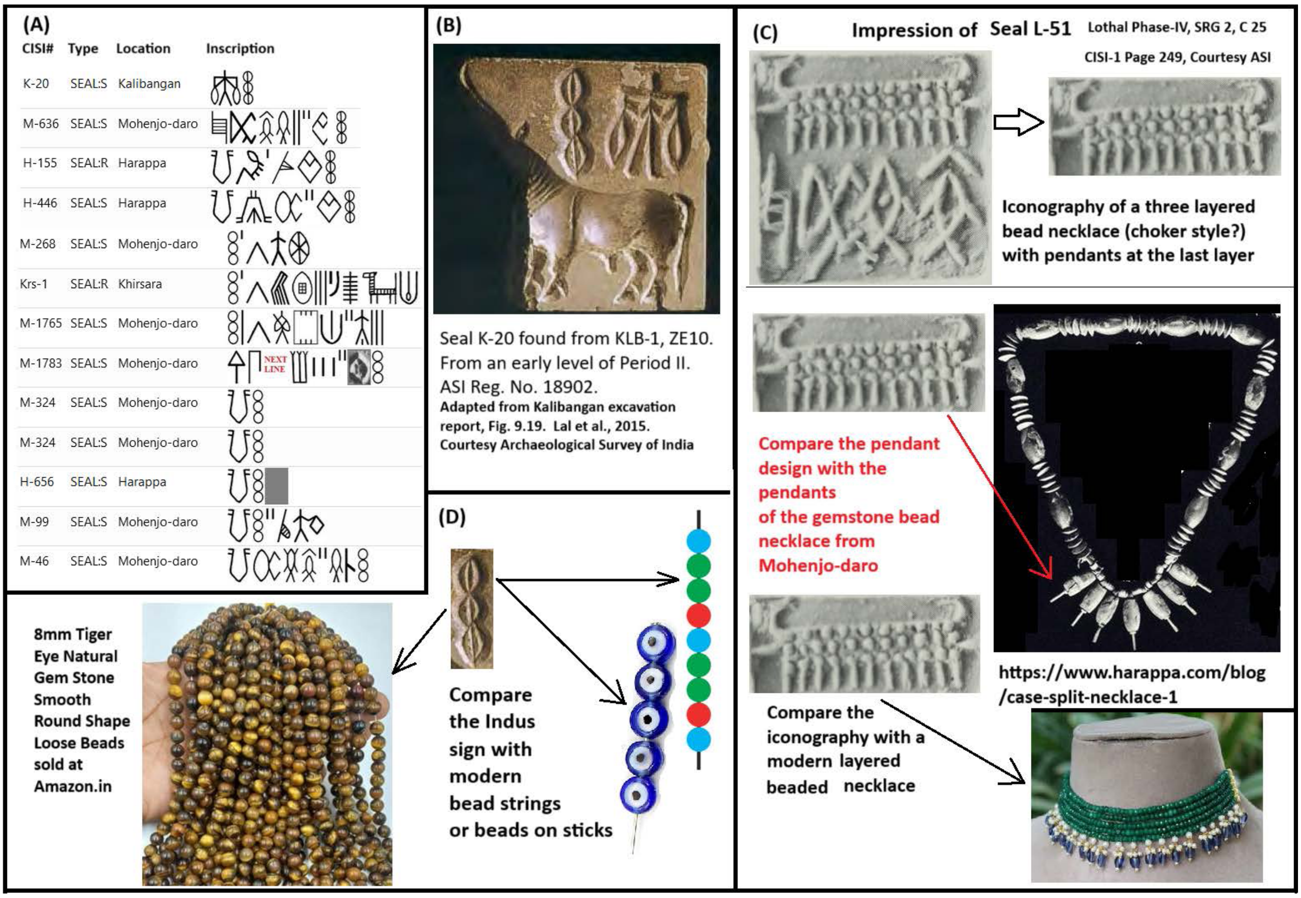

Fig. 7: Bead-string-like signs in the Indus script inscriptions (A, B, C) and fish-sign inscriptions in a seal with a rare artifact-centric iconography of a beaded necklace

in the core-informational segment, showing that was possibly specifically applicable to lapidary, jewellery, and related crafts. Importantly, in the inscription of a Mojenjo-daro seal (M-636) the bead-sign occurs along with fish-signs and the sequence in the terminal position.

5. Ethnolinguistic and historical evidence that link fish-symbolism with gemstones, shiny precious commodities, apotropaic beads, and lapidary crafts

The linguistic and cultural basis of gemstone's fish-related iconicity can be understood by exploring the ancient linguistic and historical records of both India and Near-East. To unravel the fish-symbolism related to the gemstones and beads in Indus culture, this study engages with two kinds of possibilities:

A. Homonymic usage of the Proto-Dravidian word "mīn" that meant both 'fish' and 'gemstone', could have led to the use of fish-based Indus logograms to signify gemstone related meanings (explained in Section-5.1).

B. IVC's eye-patterned gemstone beads were coveted in the ancient Near East, and were notably recorded as "eye-beads" and "fish-eye beads" in Mesopotamian

lexicons and trade documents. Thus, the apotropaic aspects of fish and fish-eye, as believed in several ancient cultures, could have led to the fish-eye based names of the apotropaic gemstone beads of IVC which contained either natural or manmade eye-patterns (elaborated in Section-5.2). Since "maṇi", the Indus word for gemstones, is discovered fossilized in documents in Near East, this study explores the possible link between the fish-eye beads, and the related meanings of the "maṇi" word, i.e., "amulet", "bead" "apple of eye", and "gemstone" (Section-5.3). This study also argues about the possible Dravidian root of the word "maṇi" (Section-5.4).

These above-mentioned possible reasons behind the fish-based symbolisms used for gemstones and lapidary craft related meanings in Indus script, need not be mutually exclusive. They might have been mutually complimentary.

5.1. The Dravidian homonymy-based aspect of fish related symbolism for gemstones

A significant portion of IVC's population most possibly had spoken some ancestral-Dravidian languages (Ansumali-Mukhopadhyay, 2021; Parpola, 1994). Therefore, some of the popular trade/craft/commodity related Indus words could have had Ancestral-Dravidian roots. According to Ansumali-Mukhopadhyay (2021), a Proto-Dravidian elephant-word 'pīlu' was used by IVC traders to signify ivory.

This word had travelled from IVC to ancient Near East through ivory trade, and remained preserved as the elephant-words 'pīri', 'pīru', etc. and the ivory-word 'pīrus', in Akkadian and Old-Persian languages. Similarly, this study conjectures that another Proto-Dravidian fish-word "*mīn", and its homonymic usages could have inspired IVC's scribes to choose fish-like logograms for signifying gemstones and similar shiny-precious commodities.

Interestingly, in several Dravidian languages (e.g., Tamil, Telugu, Malayalam, Kannada, Kodagu, Tulu, Kota, Toda), the Proto-Dravidian root-verb "*mīn", and other verbs derived from it (e.g., 'miṉṉu', 'miṉuṅku', 'minnuka', 'minugu', "miṉukku", 'minukkuka'), mean "to emit lightning", "to shine", "to glitter", "to polish, brighten, varnish, make glitter", etc. (Starostin, 2006-2013; Burrow and Emeneau, 1984). This is why, things that shine and glitter, such as stars, fireflies, glow-worms, lightning, etc., are also signified with words derived from the "*min" root. Also, 'mīṉ', 'mīn', 'mīnkō', etc., mean 'star' across Dravidian languages. Similarly, 'miṉṉal' (Tamil, Malayalam), 'minnu' (Malayalam), 'miñcu' (Kannada), etc., mean lightning (Tamil Lexicon).

Thus, as glittering and shiny polished objects, gems, jewels, and metallic coins are also signified by "miṉ"-based words. For example, "minni" (Malayalam) and "minna" (Telugu) means "a gem" and 'a jewel' (Burrow and Emeneau, 1984; Brown 1798-1884 p.992). In Sinhalese, an Indo-Aryan language with significant Dravidian influence, "mina" meant 'fish', "zodiac Pisces", and "a sort of gem" (Clough, 1892). Similarly, the Tamil word 'miṉṉal', and the Telugu words 'minuku' or 'minku', also signify meanings like 'a bright coin', 'a small gold coin', etc., evidently because of the polished glittering look of metal

coins. Thus, certain coins of ancient India were named 'putu-miṉṉal', 'tiruvāṅ- kōṭṭu-miṉṉal', etc. (Tamil Lexicon).

Now, how a semasiographic script will express gems and jewels? We know that the most important aspect of gems and jewels is that they glitter. But that intangible, abstract quality is difficult to express through a logogram/sematogram. Thus, it is quite possible that the people of IVC used the "*min"-based words, which signified both "fish" and "gems" by homonymy, for encoding such meanings through fish-like sematograms/logograms.

Certain other Indus commodities, such as faience, glazed steatite, or highly polished metallic artifacts (e.g. copper mirrors), important features of which were their shiny bright appearances, might have also been signified by specific fish-signs. The existence of Dravidian 'miṉ'-based coin-words in historical India indicate the applicability of glittering-related words for signifying certain artifacts that characteristically shine or glitter. The existence of fish-sign in the inscribed metallic implement C-38 of Chanhu-daro ( ) might have been due to such reasons.

The word "*min" is still one of the most popular words used for fish across several Indo-Aryan and Dravidian languages across India. Interestingly, if one translates the English sentence "The gem is glittering like fish and firefly" into Tamil, through Google-Translation *(https://www.google.com/search?q=English+to+Tamil)*, it reads: "Māṇikkam mīṉ maṟṟum miṉmiṉip pūcci pōl miṉṉukiṟatu". Here "mīṉ" means fish, "miṉmiṉip pūcci" means firefly, and "miṉṉukiṟatu" means "is glittering". This sentence shows how "miṉ" is one of the most widely used Tamil root-words to signify any object that glitters or shines, even today. Thus, being a semasiographic/logographic script used by a population with considerable number of ancestral Dravidian language speakers, ISC possibly chose "miṉ" (fish) based symbols to signify gemstones and other similar precious shiny commodities through homonymy.

5.2. The apotropaic aspect of gemstone's fish-eye and eye symbolism

Gemstone beads imported from IVC were highly prized commodities in Persian Gulf and West Asia. Thus, beads were among the most specialized craft items and trade commodities of IVC, having a crucial place in IVC's economy. Relevant in this context is Vidale's (2004, p.271) remark: "Just to give an impression of the possible cost of an Indus necklace or belt made of long barrel-cylinder carnelian beads, on the basis of experimental replications we calculated that the production of one of these ornaments roughly amounts to 480 days of work by a highly skilled artisan ... No wonder that such precious beads were actively sought for and monopolized by the Sumerian elites". Analysing IVC's industry-scale bead-production systems, Kenoyer (2013) too comments: "The use of shell beads with concentric circular patterns that could be interpreted as eyes begins around 7000 BC at sites such as Mehrgarh. Later, during the Regionalization Era or Early Harappan Period, new forms of eye designs were created using natural stones and also carved steatite beads and button seals. The use of eye motifs became more widespread during the urban period and continued to become more elaborate during the late Harappan and Early Historic periods."

Several texts of ancient Mesopotamia, including the Mesopotamian lexicon "Ḫ̮AR-ra=ḫ̮ubullu", have documented "fish-eyes" ("IGI-KU6" and "IGI-Ḫ̮A"), "Eye-stones" of

Meluhha ("NA4-IGI-ME-LUḪ-ḪA"), and "fish-eye-stones" ("NA4-IGI-ḪA", "NA4-IGI-KU6") among the treasured import items of Mesopotamia (Donkin, 1998; Howard-Carter, 1986, pp. 305-310). Donkin (1998, p.50) refers to a scholarly consensus that the "fish-eye", "fish-eye-stones" and "eye-stones" in old Mesopotamian texts refer to the etched carnelian beads and pebbles of banded agates, which were "cut to resemble closely a black/brown pupil and white cornea" (see Fig.8b-d), and were imported from northwest India.

As documented by archaeologist Howard-Carter (1986:305-306), certain pedagogical texts taken from tablets of Sultantepe give clear explanation of the etymology of "fish-eye-beads". The texts instruct that the "name of a stone which looks like a fish-eye is fish-eye stone" (see Fig.8a-b), "name of the stone which looks like a snake's eye is snake-eye stone", etc. Carter also clarifies that though eye-stones got their first textual references in the Akkadian version of the "Descent of Ishtar", their first archaeological appearance was in the Indus trade-port in Lothal. The eye-patterns on such gemstones, when not natural, were manmade, and were achieved by a special process called "etching", which involved painting eye-like patterns on the beads using alkaline solutions. Analysing the "dramatic increase in methods to create eye designs during the Integration Era" of IVC, Kenoyer (2013) states that, this phenomenon "cannot be explained simply as a growth in technical expertise", and hypothesizes that IVC's "eye stones", or "fish-eye beads" possibly had an ethno-historical significance of "protective amulets" (Fig.8b).

Even in modern days, eye beads or eye-shaped amulets, used as talismans against the so-called "evil-eye", are prevalent in Turkey, India, and many other places *(see https://www.nytimes.com/2017/02/22/nyregion/zigana-gift-shop-evil-eye.html; https://www.bbc.com/culture/article/20180216-the-strange-power-of-the-evil-eye).* Such beads are presently famous as "Dṛṣṭi" ('Dṛṣṭi' means eye-sight or glance in Sanskrit) and "Nazar" ("Nazar" means eye-sight in Arabic) amulets (Fig. 8a). Interestingly, the Tibetan dZi/gZi beads, which are mostly etched agate beads, are particularly prized depending on the number and type of eye-patterns etched on them (Ebbinghouse and Winsten, 1988; Reinhardt et al. 2020). Similar etched beads are also found in various places of Southeast Asia, and scholars (Glover and Bellina, 2001, pp.192, 210; Beck, 1933, p.39) believe that since etching these beads had a specialized method which few people can emulate even today, these beads that were often found in burials, were technically and culturally continuations of the apotropaic eye-patterned etched beads produced in India, whose origin was in IVC.

The significance of fish as an apotropaic amulet against evil-eye possibly stems from the fact that since in many cultures "evil-eye" is supposed to cause "drying, desiccation, withering, and dehydration", "fish are thought to be immune from evil-eye as they are always wet" (Pitts-Taylor, 2008, p.111). Even today, fish-designs are part of various protective amulets (see Fig.8 a-c).

Another relevant symbolism prevalent among the Semitic people of ancient Persia is the comparison of fish-eye to the God's watchful eye, as both never shut, and hence symbolize divine protection (Frankel and Teutsch, 1992). Even in Christianity, the term "ichthys" (symbol), which means "fish", is considered a very powerful apotropaic (Elliott, 2017), and it occurs in various amulets. Moreover, an intriguing Indic traditional symbolism that directly associates 'fish' with 'eye' is recorded in the Buddhist Aştamangala signs, where symbol

Fig. 8: Eye, Fish-Eye, and Fish symbolism in ancient and modern evil eye amulets. a) Modern Nazar and Hamsa amulets; b, d) A few examples of IVC's beads, some with eye patterns. c) Modern era agate amulets

of two golden fish or "gser nya", represent Buddha's eyes, "with which he gazes at the world with compassion" (Reis & Hibbeln, 2006; Namgyal, 2016, p.37). Also, the name of the Indian goddess Mīnākṣi, the tutelary deity of Madurai, means "one with fish-like eyes". Beautiful women with long and slender eyes shaped like the body of a fish are frequently praised in ancient Indian literature.

The above mentioned facts satisfactorily explain why fish are very often portrayed in evil-eye talismans in independent cultures. Thus, the concentric eye patterns found in natural gemstones such as agate or onyx, closely resemble the eyes of fish (see Fig.8). Interestingly, in ancient Mesopotamian medicine, the "fish-eye stone", "papparmīnu-stone", lapis lazuli, and carnelian were mentioned as part of a set of thirteen stones that were used as talismans against waning hair (Scurlock, 2014). The "pappardilû" and "papparmīnu" stones were also prescribed to be used as stone charms against ghost-induced pain (Scurlock, 2014).

Now, "pappardilû" and "papparmīnu" were banded agate stones with one and two white bands respectively (Parpola S, 2007), and as mentioned before, etched carnelian beads and banded agates imported from IVC were known as "fish-eye stones" and "eye-stones" (Donkin, 1998) in ancient

Mesopotamia. Moreover, an inscribed Kassite eye-stone amulet bead found from the early iron grave from Daba of Oman is inscribed with Goddess Gula's name (Frenez et al., 2021), who was a Mesopotamian healing deity and patroness of doctors.

Thus, it is evident that such fish-eye-patterned gemstones (see Fig.8 b-c), which were mostly imported from IVC (Howard-Carter, 1986, pp. 305-306), were indeed used as talismans against evil forces at Near East, and the names of such stones arguably had ethnolinguistic connection with the apotropaic "fish-eye" symbolism. So, along with the linguistic aspects discussed in Section-5.1, there could also be an apotropaic-related cultural basis of using fish-logograms to denote "fish-eye-beads" or "eye-beads" of IVC.

Interestingly, in the Tamil Lexicon (University of Madras, 1936), the carnelian stone is recorded as "akki-k-kal", which literally means "eye-stone", as "akki" or "akṣi" means "eye", and "kal" means stone. Now, the age and etymology of this composite word is difficult to ascertain. The word "akṣi", which was also mentioned in Vedic texts, has a possibly Indo-European etymology (Bandyapadhyay, 1932-46). Moreover, the reference of "akki-k-kal" is sourced from a nineteenth century document (Manual of the Administration of the Madras Presidency, 1893). However, irrespective of this word's etymology, it is remarkable that carnelian has been referred to as "eye-stone" in the Indic context. Moreover, in Tamil Lexicon (University of Madras, 1936), the "tiger's eye" (sardonyx) and "cat's eye" stones (chrysoberyl) are recorded as "puli-k-kaṇ-kal" and "pūṉai-k-kaṇ-kal" ("puli" and "pūṉai" signify "tiger" and "cat" respectively, "kaṇ" means "eye", and "kal" means stones). These usages indicate the eye-related gemstone symbolisms prevalent in Indian contexts.

5.3. "Maṇi" - the Indus "fish-eye" word for apotropaic gemstone beads, fossilized in Mesopotamian documents

In my quest to find out the Indus word for gemstone-beads, I searched whether any ancient word of Indian languages encompasses the meanings "eye", "amulet", "gemstone", and "bead". Revealingly, there is such a word, which arguably was also used in IVC. The Indian word "maṇi", which is used in several Indo-Aryan and Dravidian languages, is attested to signify (i) "pupil of eye" or "apple of the eye"; (ii) "amulet"; (iii) "gemstone" and " supernatural gem"; (iv) "bead" (Turner, 1999; Tamil lexicon, 1924-36; Clough, 1892), strongly demonstrating the ethno-historical connection between these meanings. Now, our "pupil of eye" resembles the round "fish-eye". Considering that IVC's gemstone beads had natural or manmade circular "fish-eye" like apotropaic patterns (Kenoyer, 2013), and they were also used as amulets (see Section-5.2), "maṇi" seems to be an appropriate word for them.

Very strong evidence that "maṇi" was the Indus word for the amuletic eye-patterned gemstone-beads of IVC, comes from the fourteenth century BC letters of "El-Amarna Correspondence" (Rainey, 2014), which repeatedly refers to the Akkadian "maninnu" necklaces, which the Mitanni king Tushratta sent as gifts to his son-in-law, the Egyptian king "Nimmureya". These "maninnu" necklaces mentioned in Tushratta's letter were undoubtedly "maṇi-hāra" or "bead-necklaces", as each of them was described as containing lapis lazuli beads and other precious stones ("ḫulalu", "ḫiliba" etc.) mounted in gold. Interestingly, as documented by

Scurlock (2014, p. 293), "Lexical texts and the Agum Kakrime inscription mention pappardilu and papparminu stone as varieties of ḫulalu-stone".

So, the ḫulalu stone must have been some type of agate, as pappardilu and papparminu stones were specific types of banded agate stones (Parpola S, 2007). Hence, the Maninnu necklaces were closely associated with stones of Indus origin. i.e., lapis lazuli, and banded agate stones. As Parpola (2015) confirms, in the Akkadian word "maninnu", the "-nnu" part was an Akkadian suffix, added to the word "maṇí" or "mani", which is undoubtedly of Indian origin, and is also used in Ṛgveda (1,122,14) — maṇi-grīvá-, "wearing a maṇi-necklace on one's neck". Yajurveda has also mentioned 'maṇi-kāra' as jewellers (Macdonell & Keith, 1912, p.120). Evidently, since IVC was the exporter of such apotropaic gemstone beads coveted in Mesopotamia, the maṇi-word travelled from IVC to ancient Near East, and remained fossilized in certain texts in its Indus form ("maninnu"< maṇi). In other cases, "maṇi" was possibly used as calques or "loan translations" in Mesopotamian languages, translated as "fish-eyes" ("IGI-KU6" and "IGI-ḪA"), "Eye-stones" of Meluhha ("NA4-IGI-ME-LUḪ-ḪA"), and "fish-eye-stones" ("NA4-IGI-ḪA", "NA4-IGI-KU6"). This 'maṇi' word is still used across India to mean gemstones.

Also, in the context of analysing Asia's maritime bead trade, Francis (2002) shows how Sanskrit "Māṇikya", Tamil "Maṇikam", Hindi "Maṇi" and "Māṇek", Malay and Indonesian "manik" and "manik-manik" (plural), are all words meaning "bead", "beads", and "precious-stone". This study confidently claims that the ancient international "eye-bead" trading, which was initiated, and for a long time dominated by the Indus traders, made this Indus gemstone word so popular across South and Southeast Asia.

5.4. Possible Dravidian root of the Indus word "Maṇi"

Even though Parpola (2015, p.86) stated that the Akkadian word 'maninnu' "is one of the few Mitanni Indo-Aryan words that have been etymologically identified", I argue that this word "maṇi", although found in the earliest Vedic texts, was possibly of Dravidian origin. In Atharvaveda, "the second oldest text in Sanskrit" (Jamison and Brereton, 2014, p. 4), we find numerous usages of the word "maṇi", which cover all kind of amulets made from different plant-based, animal-based, and mineral-based materials, used as protective charms, counter-witchcraft products, and magical instruments of attack (Bloomfield, 1899). Thus, the most ancient meaning of the word "maṇi" surely revolved around apotropaic meanings, not confined to signifying only gemstones. This goes well with my aforementioned conjecture, that the circular "fish-eye" patterns, the apotropaic symbols used in IVC, were associated with the "maṇi" word, which also meant "pupil of the eye".

This is why, IVC's etched carnelian beads and pebbles of banded agates were "cut to resemble closely a black/brown pupil and white cornea", and were called "fish-eye", "fish-eye-stones" and "Eye-stones" of Meluhha ("NA4-IGI-ME-LUḪ-ḪA") in old Mesopotamian texts (Donkin, 1998, p. 50). So, the Mesopotamian phrase "eye-stone" ("NA4-IGI") might have been a calque of the Indus word "maṇi" signifying "pupil of the eye". Thus, in ancient IVC, anything which had a round bead-like shape, could possibly be called "maṇi". But, in the Indo-Aryan languages of later India, the word "maṇi" has been mainly used in its reduced meaning of "gemstones", and "gemstone-beads".

However, across Dravidian languages, we find much wider usages of this "maṇi" word (Tamil-Lexicon). For example, other than meaning gemstones, "maṇi" also signifies small bead-like seeds in Dravidian languages, and is frequently used as a suffix to various plant-words to signify their seeds —e.g., kuṉṟi-maṇi, tāmarai-maṇi, kārā-maṇi, etc. (Brown, 1903; Tamil-Lexicon). Interestingly, the meanings of "maṇi" recorded in the Tamil lexicon include everyday objects and observations like "small round thing, as bead", "round sinkers attached to a net", "knot in a fishing net", "knuckle or joint of lobster, scorpion, etc.", "wattle on the throat of a sheep", etc. Moreover, 'maṇi'-based phrases for mundane observations, such as "maṇi-k-kaṭṭi" meaning the "bead-like formation on the surface of congealed substances, as ghee, lard", are also recorded in Tamil lexicon. These instances show that the word "maṇi" has a much deeper root and wider scope in the Dravidian culture. This wider usage of this "maṇi" word is not found in Indo-Aryan languages.

Many linguists claim that many words found in the earliest Vedic texts came from different substrata languages of non-Indo-Aryan origin (e.g., Witzel, 2019; Kuiper, 1955). Most importantly, according to certain linguists, the retroflex sounds used in earliest Vedic texts are indicative of ancient Dravidian influence (Mohan, 2021). As ingeniously argued by Deshpande (1979, p. 298), "In the case of Sanskrit, the origin of retroflexion lies not so much in the Aryans' borrowing this trait from Dravidians in early times as in Dravidians' adapting Aryan speech to their native phonology".

Thus, the bilingual "ethnic non-Aryan segment of this Aryanized community" of the Indus valley region, who participated in the composition of the earliest Vedic hymns, possibly contributed to the genesis of Vedic retroflexion (Mohan, 2021; Deshpande, 1979 p.298). In a passage of Aitareya-Araṇyaka, certain Vedic sages instruct that when one is in doubt about whether a word should be pronounced with a dental "n" or a retroflex "ṇ", according to the teachings of sage Māṇḍūkeya, one should pronounce it with retroflex "ṇ" (Deshpande, 1979). As Deshpande contends, such passages conclusively prove that in the Vedic era, the doctrine of retroflex sounds such as "ṇ" or "ṣ", were not accepted by all the composers and reciters of the Vedic hymns. So, the Vedic words that have the retroflex "ṇ", have more probability of being borrowed from the Non-Indo-Aryan languages. So, the use of the retroflex sound "ṇ" in the Vedic word "maṇi", reinforces its Non-Indo-Aryan, ancient Dravidian origin.

As observed by Vedic scholars, while being linguistically the closest text to Ṛgveda, Atharvaveda stands outside of the ritual system of the other three Vedas (Ṛgveda, Yajurveda, and Sāmaveda) and consists primarily of hymns and spells of a more "popular" nature, often magical or healing (Jamison and Brereton, 2014, p. 4). The hymns of Atharvaveda also indicate that its composers had in-depth understanding of several medicinal plants, and medicinal qualities of various animals, which is expected only from indigenous people, living for thousands of years in the subcontinent. Thus, it is possible that some of the composers of Atharvaveda, who belonged to certain indigenous bilingual tribes, used certain non-Indo-Aryan indigenous words in the scope of their original wider connotations. This possibly explains the reason that the Indus word "maṇi" was used so many times to signify amulets or charms, not gemstones, in Atharvaveda. It is quite possible that 'maṇi', the Indus word for apotropaic beads, was initially

coined by the ancestral Dravidian speakers of IVC. Thus, the word retained its wider semantic scope only in today's Dravidian languages.

6. Possible Meaning Variations of different Fish-signs

Various ISC fish-signs are constituted by making small modifications on the basic fish grapheme of ISC (Fig.1a)., which is also the most frequent fish-sign , occurring in more than 450 inscribed objects recorded in ICIT. Other frequent fish-signs are: (c. 350 ICIT occurrences) , (c. 250 ICIT occurrences), (c. 190 ICIT occurrences), and (c. 90 ICIT occurrences). Often, multiple fish-signs occur adjacently in the same inscription (e.g. , of Seal H-1678).

Now, though archaeological, historical, and linguistic evidence indicates that these fish-signs had meanings related to gemstones, beads, and possibly other shiny precious materials and related trades and crafts, how their individual meanings differed from each other is not clear yet. One possibility is that since the Indus people made various types of precious shiny materials and artifacts, such as gemstones, glazed steatites, faience, highly polished metallic artifacts, etc., they needed different types of mutually related signs to signify such object categories. Even among bead-making materials, wide variations existed. For example, Indus people used extremely expensive gemstones (e.g., lapis lazuli, carnelian, banded agate), comparatively less expensive gemstones (e.g., turquoise, jasper, quartz, green felspar, onyx, haematite, limestone, serpentine, breccia), precious metals (gold, silver, copper, bronze), and less costly materials (e.g., shell, steatite, faience, clay, vitreous paste, etc.). Since the prices, and tax-rates or licensing rates of such materials could have differed a lot, different signs for different categories might have been used. Alternatively, some of the fish-signs could also have signified licensing of different types of lapidary and craft-making activities such as gem cutting, glazing, etching, metal polishing, etc.

Interestingly, the most frequent fish-sign is very often preceded by numerical stroke signs. For example, in around 131 inscriptions recorded in ICIT, some stroke numeral has preceded : (68 inscriptions) , (6 inscriptions), (20 inscriptions), (15 inscriptions), (2 inscriptions), (2 inscriptions), (1 inscription), (4 inscriptions), (1 inscription), (12 inscriptions), (1 inscription). But fish-signs other than , are very rarely preceded by Stroke-numerical signs, and there are only around 15 such inscriptions recorded in ICIT— e.g. (H-25), (M-1266), (H-440), (M-951), (M-1910), (M-1982).

Sign might have contextually signified the most general category of the commodity types signified by the fish-signs (e.g. 'gemstones'), and the metrological/revenue standard related to that general commodity-type. Thus, the numerals preceding possibly contextually denoted the licensing-fees, tax-rates, or barter based equivalencies related to such commodities and associated trades/crafts. The other fish-signs possibly signified more specific meanings related to gemstones, lapidary activities, and other shiny-precious materials signified by them.

7. Fish-sign with bead-sign on a "gemstone-bead" container?

The absence of any "Rosetta Stone" like multilingual multi-script Indus document has been often stated as one of the main reasons that ISC is not yet decoded. However, ancient inscribed implements that are not multilingual/multi-script documents, may also help in the decipherment of inscriptions. This is because the inscriptions engraved on those implements are often related to their functionalities, which can help us to narrow down and infer the semantic scopes of such inscriptions, and facilitate their decoding.

For example, a 1700 BC ivory comb excavated from Tel Lachish, which was used for removal of lice from the hair of head and beard, and has yielded the remains of head lice, contains a functionally related seven-word inscription in early Canaanite script of pictographic style. Its inscription read "ytš ḥṭ ḏ lqml ś‘[r w]zqt", meaning "May this tusk [ivory comb] root out the lice of the hai[r and the] beard" (Vainstub et al., 2022). The purpose (lice removal) and material of this ivory comb, and the linguistic and metonymic tradition of the related civilization (e.g., the tradition that ivory combs were referred to as "tusk" or "ḥṭ") have enabled the researchers to decode the script. Similarly, as discussed in Ansumali-Mukhopadhyay, 2024b, the occurrence of sign on a goldsmith's tool has reinforced its decoding as the crucible-blowpipe symbols used to signify gold/precious-metal/goldsmithing related meanings. As discussed below, another unusual inscribed object of IVC, that has a fish-sign and a bead-string-like sign engraved on it, can help us to identify the object's functionality, reinforcing our gemstone-bead related hypotheses

7.1. The inscribed "drain-pipes" of Kalibangan

Regarding the artifact shown in Fig.9A, the Kalibangan excavation report's volume-1 (Lal et al. 2015, pp. 556) writes the following:

"Two pieces of wheel-made, well-fired terracotta pipes, which may have been used for water drainage, bear inscribed signs. One of them (Fig. 9.91, No.2) bears the fish symbol (M-List No. 59). while the other (Fig. 9. 91, No. 1) has three interconnected vertical ovals, one below the other, the middle one having a vertical stroke inside (cf. M-List Nos. 415 and 417). The Reg. Nos. respectively are No. 21582 and No. 21583. These were found from a late level in, Sq ZA8 of KLB-1."

The report (p.74) also mentions that those 'drain pipes' were "not in situ". The volume-2 of the Kalibangan excavation report (Lal et al., 2020) states the following:

"KLB-1, has yielded two examples of terracotta pipes from a residential area in trench No. ZA8, Qd. 3. Both were discovered in the big house of an important person, which belonged to Phase V. Both are wheel-made, out of which one is intact and [the] other slightly damaged. One pipe is joined with another by a rim which could be entered into another pipe to hold it [Fig.20.4(b)]. The pipe is 26 cm long up to the rim. The rim has having a width of 4 cm and a dia. 11.8 cm. The dia. of the other end is 14.5 cm. The pipes were an important object and are marked by an incised chain and the fish symbol. After joining these pipes, the total length of the pipes is 56 cm. From a late level of Period II. (KLB-1, Reg. No. 21582 and 21583)."

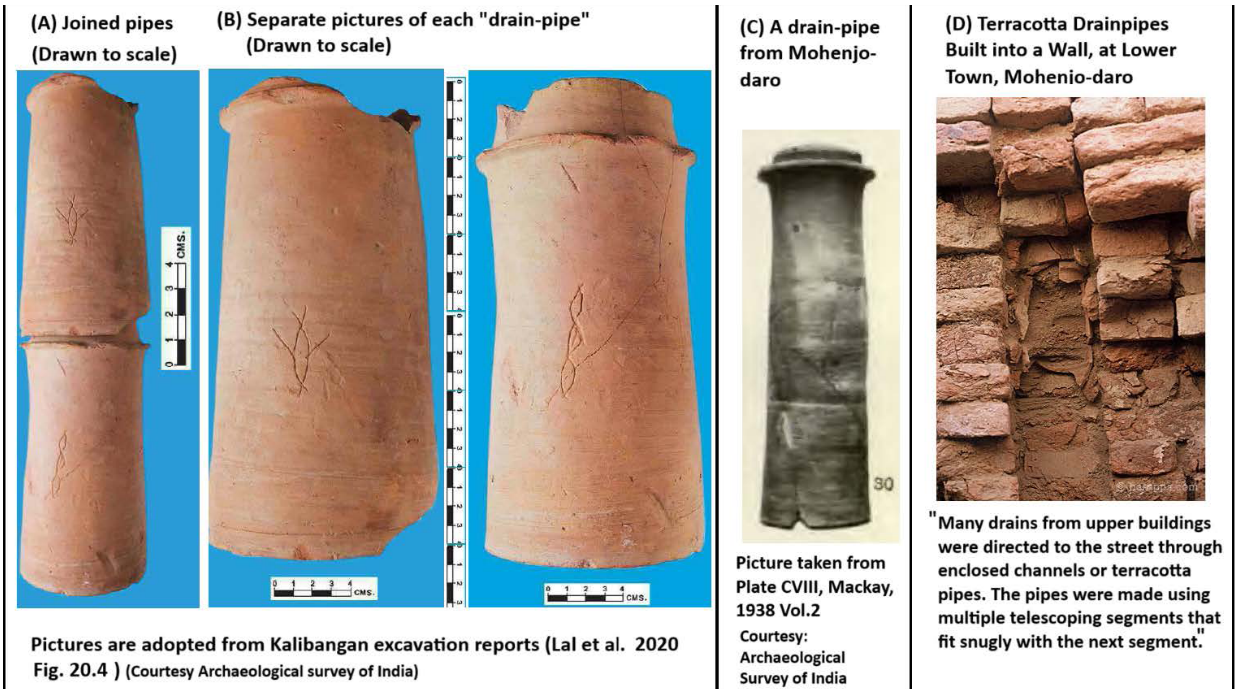

Fig. 9: Inscribed ancient "drain-pipes" found (not in situ) from an excavated house of Kalibangan (A, B), and examples of similar drain-pipes used in Mohenjo-daro (C, D)

7.2. Drain-pipes repurposed to make quiver-like protective containers to keep gemstone bead strings?

The way modern human beings repurpose various kinds of tools, prehistoric people also did the same. For example, see the article Cooper, 2024, titled "Prehistoric Repurposing of Mississippian Dover Tools". Another article (Raczek et al., 2018) titled "Artifact Reuse and Mixed Archaeological Contexts at Chatrikhera, Rajasthan", explores how various ancient Indus artifacts are being repurposed by modern villagers of India, to understand how similar repurposing and recycling of artifacts might have happened in prehistory. In my opinion, these two drain pipes were also repurposed as a quiver-like container of bead strings, or beads stuck around sticks (see AI-generated, schematic images of Fig. 10). The fish-sign here signified gemstone, and the bead-string sign signified beads, indicating that it was a "gemstone bead" container. The reasons behind these hypotheses are as follows:

i. The drain-pipes were inscribed. Why would someone scribble Indus script signs on drain-pipes, which will not be visible when installed inside walls or floors? In case such artifacts are at all inscribed, those inscriptions are expected to be stamped inscriptions that were applicable to many such artifacts for providing useful information about their manufacturers, their materials, their quality, etc. But these signs were incised by someone after the drain pipes were made.

   The inscribed signs are also not random. One drain-pipe is inscribed with sign . Here only the middle oval shows the vertical line ,but that seems to be the lack of aesthetic

motivations or the haste of the scribe, who engraved the sign for its meaning, not its decorative look. Now, the sign is already found in a Kalibangan seal (see Fig.7B). So, it is expected to have a standard commercially important meaning, which according to our hypothesis is related to beads and lapidary crafts. The other drain-pipe contains a fish-sign, which according to our hypothesis, signifies gemstones. As discussed in Section-4.2, and shown in Fig.7A, in multiple seal inscriptions, gemstone related fish-signs have co-occurred with bead-string like signs or . So, their co-occurrence on these pipes should also not be accidental.

ii. The drain-pipes were not found in situ. This means that unlike the drain-pipe of Mohenjo-daro shown in Fig.9D, these two drain-pipes were not found as built into a wall. Then what were they used for?

Certain plausible scenarios might explain this puzzle:

- The owner of these drain-pipes did not want to install them inside a wall for drainage purposes. They were repurposed as a quiver-like container. The inscribed signs indicated the contents of the container. It is possible that a merchant packed strings of valuable and fragile gemstone beads inside these drain-pipes, carefully tied their joints with strings and covered their ends with perishable materials such as clay, wooden lids, or leather, and scribbled the signs on the container, so that without opening it, its content could be known. The same container might have been retained by the recipient owner to store similar things. Drain-pipes with telescopic joints might have been quite handy for an artisan for storing bead-sticks of varying lengths, as by simply adding or removing a pipe, the container's length could be easily changed. Please check the AI generated images in Fig.10, that explains such designs.
- Another interesting possibility was that the drain-pipes were built into a wall, but were actually used as a hidden storage of valuables, such as precious metals or gemstone beads. The ISC signs were used so that the owner could easily check which pipe contained the valuables when he needed to access them in urgency. Various hordes of precious commodities have been retrieved from Indus sites, which were securely buried under the floor. This might have been another such innovative hidden storage facility. If this seems too far-fetched, one might explore how fake walls, fake plumbing pipes, false ceilings, fake bookshelves, or mattresses are used to hide valuable things in modern homes. For example, a recent article at *https://newsukraine.rbc.ua/news/5-unexpected-ideas-for-hidden-storage-in-1722640177.html* suggests the following: "A curtain rod, a mop handle, or any empty pipe that opens and closes easily can serve as a great hiding place for money. Just roll the bills into a cylinder, like American criminals do in the movies. It's also important to attach some string to the money for easier retrieval from inside the pipe." In ancient Kalibangan, bead strings could have been similarly secured in a secret marked chamber in a wealthy merchant's house. Truth is often stranger than fiction.

However, I believe that Scenario-A, where drain-pipes were used by merchants as protective containers for storing and transporting precious and fragile items, is a much more likely scenario. To check what a generative Artificially Intelligence system will think about the

scenario, I asked ChatGPT, “In what ways could the people of Indus civilization repurpose their drain pipes? Please explain with examples.” ChatGPT gave the following answer, which twice mentioned the possibility of ancient drain-pipes being used as containers of beads, jewellery, and related tools:

“The Indus Valley Civilization was known for its ingenuity, and terracotta drain pipes could have been repurposed into containers for various uses. These cylindrical, durable structures would suit many practical applications.

For storage, pipes could hold grains, spices, or liquids like water and oils, keeping them protected and dry. Smaller pipes could serve as organized storage for beads, threads, or tools used in crafting and jewelry-making.

Repurposed pipes might also serve in cooking and food preparation, as terracotta withstands heat. They could store fermented products like curd or act as roasting vessels. Pipes could function as quivers for arrows or storage for farming tools, combining practicality and portability.

In rituals, pipes might hold sacred offerings, ashes, or burial items. For gardening, they could be used as planters or water channels in small irrigation systems. Broken pipes might even transport valuable trade goods like beads and spices.

Decorative uses were likely too, with pipes arranged as columns or adorned artistically. Their adaptability extended to communication, serving as primitive horns.”

In a reverse process, I uploaded an image of the joined inscribed Kalibangan drain-pipes at *https://gemini.google.com*, and asked Google’s generative AI Gemini to analyze it. Gemini could recognize it as a “prehistoric vessel”, made of terracotta, and stated its possible use as a storage container. So, at least from the viewpoints of unbiased AI systems, my conjecture regarding the functionality of these drain-pipes is logical and plausible. So, my decoding of the “drain-pipe” inscriptions, that support this article’s hypotheses regarding the fish-signs and bead-string signs, also seem quite plausible and logical.

8. Conclusion

This article attempts to decode certain ISC-signs based on the archaeological contexts of their inscriptions, the script-internal relationship of these signs with certain other decoded signs of Indus script, and by comparing the ancient symbolism used for the commodities found in the archaeological contexts of these signs, with these signs’ iconicity. This is possibly a novel approach for decoding Indus script, not present in any existing research on ISC. The hypothesis that the Proto-Dravidian root-verb “*mīn”, which signifies “to shine,” “to glitter,” and “to emit lightning”, has been used to derive the Dravidian nouns for “fish”, and “gemstones”, should explain the affinity of Indus script’s fish-sign inscriptions to lapidary contexts. In this context, I also want to mention that the Persian word ‘minakari’ (‘میناکاری’), which means “enamel” or “azure,” referencing the bright, glass-like finish that resembles the clear blue of the sky, may also be linked to this “mīn”-based Indus word of ancestral Dravidian origin. Like Persian, even in Telugu, “minnu” means sky or heaven (Gwynn, 1991, p. 422).

The way the Proto-Dravidian elephant-word 'pīlu' used by the Indus ivory-traders travelled from IVC to ancient Near East through ivory trade, and remained fossilized in their vocabulary (Ansumali-Mukhopadhyay, 2021), the "mīn"-based Indus-Dravidian word for gemstones, shiny glittering things, and polishing, might have also remained preserved in the ancient languages of Persian Gulf as a loan-word.

It is quite possible that the glazed "compact glassy faience" of IVC *(https://www.harappa.com/content/reconstruction-faience-tablet-manufacturing)*, which was often made in blue colour to imitate "deep azure blue lapis lazuli", and "blue-green turquoise" *(https://www.harappa.com/indus2/174.html)*, was the original inspiration of the Persian word "Minakari". Interestingly, in Egyptian Hieroglyphs, the other meanings of the hieroglyph used for faience ( ) are "sparkle, shine, coruscate, lightning, lightning-stone, and blue-glazed faience." That hieroglyph also uses the hieroglyph of 'sky' or 'heaven' as one of its components (Budge, 1920 p.cxxiv).

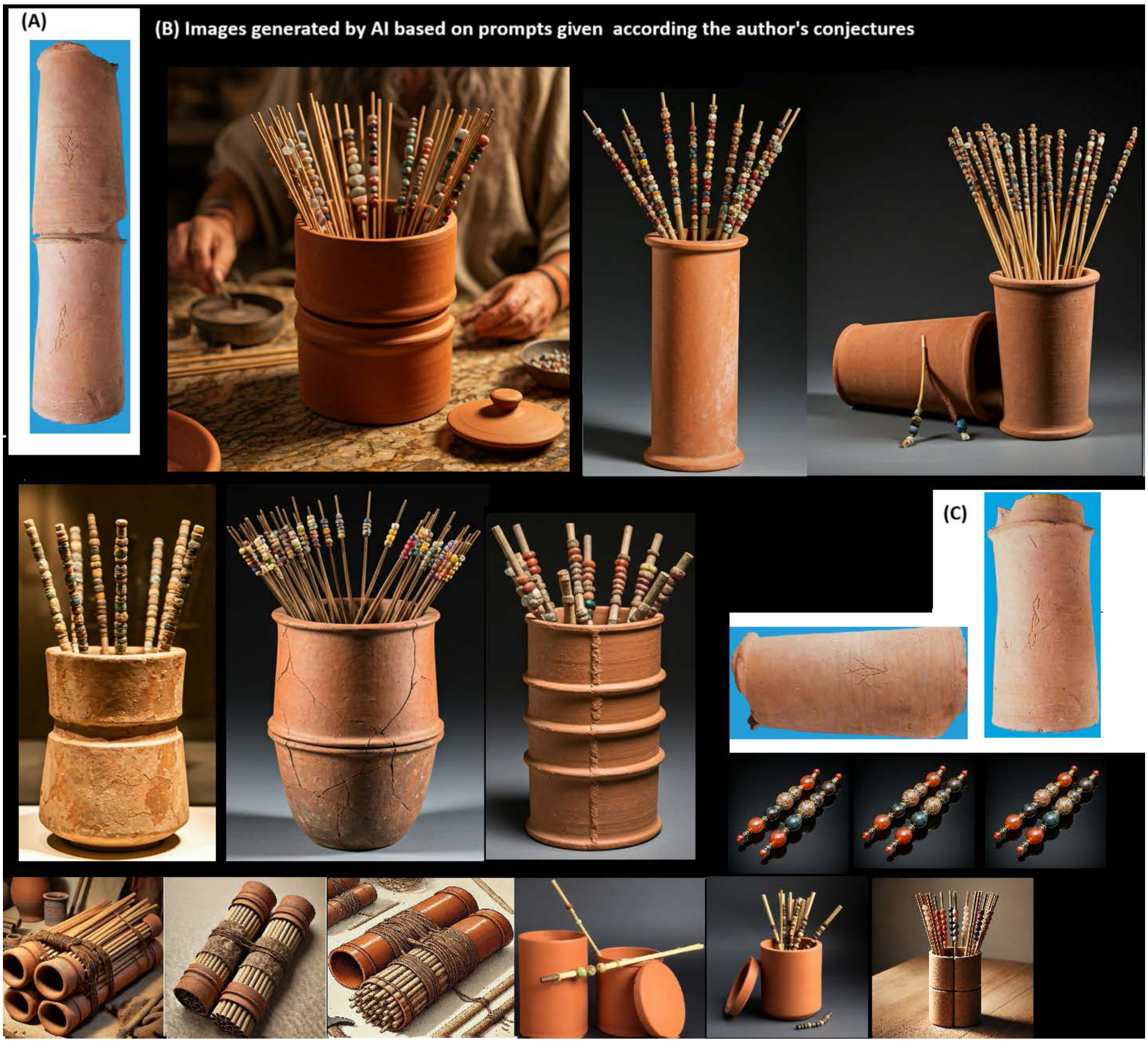

Fig. 10: AI-generated schematic visualizations of repurposed drain-pipes used as containers of gemstone bead strings stuck on sticks (B), and their comparison with the inscribed drain-pipes of Kalibangan (A, C). All the AI-generated images are kept in black background and the images of actual Indus artifacts are given white backgrounds to avoid confusion.

Interestingly, Dravidian "mīn" based words also mean sparkling, lightning, gemstone, bright coins, and sky. This validates my conjecture that the same symbolisms have been used in different civilizations for these meanings, though their graphemic and linguistic forms have been different based on the civilizational cultures and linguistic traditions. So, the Indus-Dravidian mīn-based words seem to be very strong candidates as the root-word of the Persian word Mīnākārī. Later, when the craft of enamelling metals and ceramic tiles (initially mainly in blue colour) further flourished in Iran, this word might have been reused to coin the "mīnakari" term for enamelling. Thus, it might later have come back to India, disguised as a Persian word. Future researchers should explore the validity of this intriguing conjecture using archaeological, historical, and linguistic evidence.

Also, "maṇi", the Indus word for apotropaic "fish-eye" beads, which has been fossilized in ancient Near Eastern documents both in its original form ("the 'maninnu' necklace"), and its calque-form "fish-eye stone", corroborates the use of fish-symbolism for gemstone beads in ancient IVC. The possible Dravidian origin of "maṇi", and the typical Dravidian homonymy used for the "*mīn"-based fish-words and gemstone-words, indicates that the fish-symbolisms used in Indus script signs possibly have an ancestral Dravidian origin. My conjecture regarding the functionality of a quiver-like container made by repurposed drain-pipes also helps us to understand why a fish-sign and a bead-string-like sign was inscribed on it.

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